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LABORATORY AND X-RAY SERVICES DIVISION

MANITOBA HEATLH SERVICES COMMISSION

WINNIPEG, MANITOBA

Editor: Adrian N. C. Delaat, A.R.T.

November 1991

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REPORT FROM THE DIRECTOR

The Laboratory and X-ray Services Division is a Division of the Manitoba Health Services Commission (MHSC) of the Manitoba Government. The Division operates Diagnostic Units throughout Manitoba, as well as the Cadham Provincial Laboratory in Winnipeg.

The Cadham Provincial Laboratory has served Manitobans as their public health laboratory since 1897. It also provides a range of diagnostic services to Manitoba and regional physicians, together with reference and consultative services to other medical laboratories. Furthermore, staff conduct relevant research projects, and play a large role in the education of health care professions in areas within their expertise.

The Rural Laboratory and X-ray Service (LAXUS) is involved in the delivery of laboratory, radiography, electrocardiography and ultrasound services at 74 hospitals in Manitoba. In 49 hospitals we provide full service. Seven other hospitals are served regularly on a visitation basis. Fourteen more hospitals hire their own technologists, but otherwise relate to our Division with it in charge of their Diagnostic Services. A final four hospitals hire their own staff, purchase their own resources, but use the Division for consultation, supervision, education, quality assurance and other regulatory activities.

The delivery of health care services appears to be fundamentally changing. Our Division is actively working to incorporate new and useful ideas into its operation. To facilitate this process, we have had a series of internal retreats of both the Cadham Provincial Laboratory and among LAXUS staff. The fundamental purpose of these retreats was to identify Divisional values to help us steer a course during these turbulent times. Direction based on these values is essential to help our staff work together, as we chart our course for the future.

The final results of these dicussions were completed early in fiscal 1991/92. We believe our new Mission Statement and our Goals are important enough for an early release, and are presented on the next page.

We remain committed to working with other health organizations and individuals to improve the health of Manitobans. We've summarized these ideas in our motto of "Quality Service with Innovation" as concepts to guide us.

G. Hammond, M.D.

MISSION STATEMENT

The Division plans and develops high quality laboratory and imaging services for Manitobans to prevent, monitor and detect human diseases and provides these services in an effective manner, in cooperation with other health care providers.

GOALS

1. To provide relevant diagnostic and public health services as determined in cooperation with our users.

2. To achieve the highest possible standards of performance.

3. To ensure that all staff take responsibility for the quality of their work.

4. To ensure the efficient use of our resources.

5. To maintain a human sensitivity that will lead us to serve in a "user friendly" manner.

6. To provide effective communications and to cooperate with other health care providers.

7. To actively participate in research, development and evaluation of diagnostic and preventive public health services.

8. To establish and maintain ongoing learning and teaching activities relative to the provision of diagnostic and preventive public health services.

9. To respond in a timely fashion to requests for results or information.

10. To maintain confidentiality of patient and other sensitive information.

11. To promote a harmonious and safe workplace environment.

12. To plan and formulate proposals for the future delivery of diagnostic and preventive public health services.

LABORATORY AND X-RAY SERVICES DIVISION

SENIOR STAFF LISTING

DIVISION DIRECTOR: G. W. Hammond, M.D., FRCP(C) (Int. Med., Med. Micro., Inf. Diseases)

LABORATORY PHYSICIANS

J. G. Fox, M.D., FRCP(C) (Path.), Dip. Bact. (Tor),
L. Sekla, M.B., B.Ch., DTM&H, D.M., Ph.D.
T. Williams, M.B., B.Ch., DPH, FRCP(C) (Ped & Med. Micro)

MANAGER: M.W. Burroughs, FCAMRT, A.C.(R), R.C.T.

SCIENTISTS, CPL:

G. Ahluwalia, B.Sc.
M. Dawood, Ph.D.
D.E. Gelskey, M.S., MPH, Dr., PH
A.C. Maniar, M.Sc., Ph.D., D.Sc.
P. McNichol, B.Sc., Ph.D.
D. Milley, B.Sc., R.T.
W. Stackiw, B.Sc.
R. Thompson, B.Sc., R.T.

REGIONAL SUPERVISORS, RURAL UNITS:

EASTERN MANITOBA: X-RAY - L. Wilson, R.T., R.C.T.
LABORATORY - Wm. Strukoff, DHA, R.T.

WESTERN MANITOBA: X-RAY - E. Carroll, R.T., R.C.T.
LABORATORY - W. Yaschyshyn, R.T.

NURSE EPIDEMIOLOGIST: D. Phippen, Reg.N., B.A., C.I.C.

EDUCATION CO-ORDINATORS:

LABORATORY MEDICINE - A.N.C. Delaat, A.R.T.
RADIOLOGY - J.D. Brownlee, B.Sc., R.T.

COMMUNICATIONS OFFICER: J.M. Matthews

DIVISION SPECIALIST TECHNOLOGIST: S. Giercke, A.R.T.

DIVISION ACOUNTING CLERK: C. McComber

CONSULTANTS:

Chemistry - P. Desjardins, Ph.D.
- L. Seargeant, Ph.D.

Radiology - D.W. MacEwan, M.D., FRCP, FACR

PERSONNEL CHANGES

During this fiscal year, the Division welcomed new staff:

Nicholson, Kathy	MG3	Dauphin Lab & X-ray Unit
Tripp, Christina	AY3	Swan River Lab & X-ray Unit
Durocher, Brigitte	MG1	Pine Falls Lab & X-ray Unit
Collignon, Brad	MG1	Clinical Microbiology, CPL
Loeppky, Roland	MG1	Winkler Lab & X-ray Unit
Rundle, Shirley	AY2	Administrative Services, CPL
Cleave, Dorilla	AY3	Ste. Rose Lab & X-ray Unit
Paull, Tannis	AY3	Virden Lab & X-ray Unit
Carter, Sherry	AY3	Virden Lab & X-ray Unit

RETIREMENTS

Nil

RESIGNATIONS

Howard, Robert	SC1	Central Warehouse
Hallett, Linda	MG1	Clinical Microbiology, CPL
Friesen, K.Grace	MG3	Minnedosa Lab & X-ray Unit
Gillett, Glen	MG1	Winkler Lab & X-ray Unit
Cook, Claudette	MG1	Reston Lab & X-ray Unit
Hanson, Shannon	MG1	Melita Lab & X-ray Unit
Pospisil, William J.	MG1	Reston Lab & X-ray Unit
Simpson, Darlene	AY2	Portage la Prairie Lab & X-ray Unit
Copps, Anne	MG1	Pine Falls Lab & X-ray Unit
Goertzen, Darlene	CT2	Winkler Lab & X-ray Unit

TRANSFERRED OUT

Nil

MATERNITY LEAVES

Cadham Provincial Laboratory - 5
Lab & X-ray Services - 15

PROMOTIONS

Dawood, Magdy	SX3	Virology, CPL - March 24, 1990
Cwir, Brian	MG4	Dauphin Lab & X-ray Unit - July 14, 1990
Brugghe-Michals, Doreen	MG2	Notre Dame Lab & X-ray Unit - September 10, 1990
Craig, Linda	MG1	Selkirk Lab & X-ray Unit - January 26, 1991
Matthews, Janice	CP1	Administrative Services, CPL - January 26, 1990

COMMUNICATIONS

The Cadham Provincial Laboratory is linked electronically (PC) to each of the 74 hospitals served. This link allows us to report all our results on an "on-line basis", reducing turn-around time to an absolute minimum.

In the 1990/91 fiscal year, the changeover from the Texas Instrument Silent 700 (TI) hardware to Unisys computers for our communications system was completed. We continued to experience a fairly high volume of equipment failures, primarily hard disks and printers, however, equipment malfunctions have substantially decreased over the year.

The communications system we are using delivers laboratory test results to electronic mailboxes on the same day that the results are entered in the mainframe computer. Data Entry clerks in the Cadham Provincial Laboratory (CPL) enter the patient demographic data for Microbiology, Virus Detection and for Serology; they then enter the results for Microbiology and Virus Detection. All results entered that day are electronically retrieved from the mainframe that evening, downloaded to a PC where they are formatted into the "Report Form", then the PC sends them to the electronic mailboxes. Reports are retrieved from the mailboxes by the user entering their unique ID and Passwords.

As communication technology continues to change, we will do everything it can to update its system to provide as efficient a service to our users as is possible.

Considerable progress has been made in preparing to automate the balance of the Serology laboratory (including Parasitology). A working group consisting of the Programmer/Analysts, Data Processing Supervisor, Serology staff, Data Entry staff and CPL Communications staff has progressed to the stage where programming is now underway. Several of the data entry screens have been signed off as completed. It is hoped that this major undertaking will be completed, tested and in place by the end of 1991. Having all of Serology on line will have a significant impact on our Electronic Messaging System.

The Data Entry section of the Division is participating in its own Quality Control program by noting all errors and conducting analysis of them. The QC program is used to monitor the incidence of errors with the objective of reducing as many as possible. Their efforts have shown improvement in senders errors. This next fiscal year will focus on errors made by Data Entry staff themselves with the objective of reducing their errors to even less than what they now incur.

INFECTION CONTROL PROGRAMS

This program is provided to assist rural hospitals and long term care facilities in the establishment of infection control programs and in the training of infection control practitioners. Ongoing consultation and continuing education services are included.

One hundred and one facility visits were made during which 45 continuing education sessions were provided. Attendance totalled 885. Various infection control or infectious disease topics were presented.

Telephone consultations addressed a host of questions and numbered 316.

Three, two-day training courses were provided for 17 hospital and 29 long care employees.

Mighty Microbes, an information bulletin continues to be popular. Long term care infection control practitioners received four issues as did hospitals.

Miss Phippen remains active on the Health and Welfare Steering Committee on Infection Control Guidelines, the Working Group on the revision of Infection Control Guidelines, the St. Amant Center Infection Control Committee, MACID-IC Sub-committee, CHICA-Manitoba, and the Biomedical Waste Committee. She participated in several educational sessions for Provincial and Federal Public Health Nurses and Medical Officers of Health. As well, she acted as an advisor and lecturer for University of Manitoba Continuing Education courses and for a Kenyan Nurse taking an IC course from Brandon University.

QUALITY CONTROL AND TECHNICAL SERVICES

Quality Control

This section provides internal quality control services to a number of disciplines at Cadham Provincial Laboratory and microbiology quality control to laboratory & x-ray units in rural Manitoba.

In the Q.C. section, we coordinate external programs from the College of American Pathologists (C.A.P.) and the Laboratory Center for Disease Control (L.C.D.C.). The College of Physicians and Surgeons in Manitoba, had notified all laboratories providing services in Microbiology; that due to the difficulty in receiving specimens from C.A.P. through customs, purchase of these surveys was not recommended. Since CPL is a reference laboratory, we felt it imperative that we continue to purchase the relevant surveys. That task has become even more onorous with changes brought about by the Clinical Laboratory Improvements Amendments Act (C.L.I.A.) introduced in the United States for 1991.

All these changes have increased the number of C.A.P. surveys we coordinate from three to thirteen; and proportionally, the number of specimens have increased from 100 to 325. External surveys coordinated through this section include: C.A.P. AFB smear, Bacteriology, and Mycology, Chlamydia IF, Herpes IF, Chlamydia EIA, Herpes culture, Rapid Microbial Detection, Parasitology, Limited Immunology, Virology Culture and Virology Antibody; and L.C.D.C. Microbiology and Virology surveys.

At the CPL, the Quality Control section provides intensive programs to Clinical Microbiology, Virus Isolation, Environmental Microbiology, and Serology. We provide demographic data on requisitions prepared to mimic a true clinical specimen. Swabs, blood cultures, cerebral spinal fluids, sputa, etc. are seeded with both normal flora and pathogens from our extensive stock culture supplies (that now number over 500). Commercial preparations, specimens obtained from city of Winnipeg health inspectors, and internal viral isolates or specimens are used as other sources.

Internal proficiency test specimens for lab & x-ray units are limited to microbiology culture, Gram stain smears, urine for pregnancy testing, swabs for beta Streptococcus, Group A and serum for infectious mononucleosis. Since this proficiency survey has replaced the surveys previously purchased from C.A.P., we will be increasing the numbers over the next few months.

An integral function of the quality control section is the evaluation of new or improved products; methods, performance of products and formulas in use, and modifying or adjusting these methods when required.

Media Section

The workload in this section continues to increase each year as we provide more or new services to CPL and lab & x-ray units. Most of the increase has been in areas of reagents for new procedures or projects at CPL. A total of 378,924 plates were poured, 174,359 tubed media were prepared, and 46,510 misc. items.

We have prepared the following new reagents, stains and media:

1. Phenolized medium for a micro-immunodiffusion test for the detection of Blastomycosis, prepared for the Serology Laboratory.

2. Penassay Broth for the detection of the verotoxins of Escherchia coli 0157:H7 for Clinical Microbiology and Environmental Microbiology Research and Development (R&D). This broth was used for stools and hamburger microbiology samples.

3. H.C. Plates for the isolation of Escherchia coli 0157:H7 in Environmental R&D.

4. Aerosporin (Polymyxin B Sulphate) for detection of verotoxins of Escherchia coli 0157:H7 in stool and hamburger.

5. Brain Heart Infusion Broth for verocytotoxin production and detection in Environmental Microbiology R&D.

6. Nutrient Broth for verotoxin-producing Escherchia coli as a pre-enrichment in Environmental Microbiology R&D.

7. MacConkey Broth for verotoxin-producing Escherchia coli as a selective enrichment for R&D Environmental Microbiology R&D.

8. Trypticase Soy Novobiocin Broth for verotoxin-producing Escherchia coli as an enrichment for Environmental Microbiology R&D.

9. Buffers, acids, bases and specially formulated media for Clinical Microbiology R&D to be used in assaying a minimum inhibitory concentration procedure for fastidious organisms.

10. G.C. agar plates and antimicrobial suspension solutions for Neisseria gonorrhoeae antimicrobial evaluations in Clinical Microbiology R&D.

11. Dermatophyte Test Medium, a new formulation had to be developed as the prepared media powder was no longer available.

12. ZYME B Reagent for use with the API Rapid Strep Identification kit.

13. Versene used in the Salmonella mutigenicity test.

14. Lysozyme Broth for Clinical Microbiology to differentiate Nocardia brasiliensis and Actinomyces madurae.

We continue to monitor the Chemiclaves for Manitoba Dental Health by incubating, recording and reporting results and recommending where repeat testing is indicated.

CLINICAL MICROBIOLOGY

Physicians in both rural and urban Manitoba send specimens to Clinical Microbiology. These specimens are submitted to help the physician clinch the diagnosis of a specific infection.

The most common specimens submitted are those for detection of the etiological agents of sexually transmitted diseases. The most prevalent of the sexually transmitted diseases is caused by Chlamydia trachomatis. This organism is capable of producing infertility and pelvic inflammatory disease, inflammation of the cervix and urethra, pulmonary and eye infections in the newborn, and other less common problems. The disease has been declining in the last few years possibly due to the effectiveness of the Sexually Transmitted Disease control program. This is being further studied in cooperation with Dr. P. Orr and Dr. N. Roos because it is one of the first programs to demonstrate this decrease. The highest incidence of the disease is in the 15 to 25 year age group in women and 15 to 35 year age group in males. However, 25% of infections are asymptomatic. A new strategy is being tried to detect the asymptomatic male carriers now that Chlamydiazyme has received FDA approval to be used on urine specimens.

Two cases of virulent streptococcal infections have been diagnosed in Manitoba. Although there have been no deaths from these organisms in Manitoba, there have been deaths in the U.S.A., Ontario, and B.C.

Verotoxin-producing organisms are still present in Manitoba. These organisms, often found in hamburger meat, cause severe colitis and other severe conditions with occasional deaths. The number of isolates found this year is smaller than in the previous two years thus suggesting that health education has had some beneficial effect in alerting the public to properly cooking hamburger meat.

In order to obtain the most efficient and accurate materials for use in both CPL and the rural laboratories, assessment of new tests and kits is ongoing often in collaboration with others. In collaboration with Mount Carmel Clinic's Dr. Katz and the Serology section of the CPL, a serological test for detection of chlamydia was assessed against antigen detection. It was found to lack accuracy and was thus unsuitable for our purposes. Collaboration with Dr. K. Rozee and others in his department at LCDC, Ottawa was needed to assess the accuracy of Chlamydiazyme (our present antigen detection test for C. trachomatis infections) using his polymerase chain reaction test. Chlamydiazyme was found to be accurate and its sensitivity satisafactory for our purposes.

Work with Drs. Embree and Morris at the child abuse clinic continues in evaluating various diagnostic procedures in assessing sexually abused pre-pubertal children.

See also Tables 6-1-6-6.

ENVIRONMENTAL MICROBIOLOGY

This section tests samples of water, wastewater, food and air to ensure that their microbiological quality meets Canadian standards. In addition, the section is involved in the investigation of foodborne and waterborne illnesses.

Water Analysis

1. A total of 1,101 water samples were tested for P. aeruginosa and 241 (22%) were positive; of these, 197 were serotyped. As in the past five years, serotype 6 was the most common one, (37% of all those typed) with serotype 10 as the second most common serotype (24%). There was a significant increase in the number of requests for testing, as well as an increase in the number of isolates.

	1989	1990
Serotype 1	11	13
2	0	2
3	4	4
4	7	9
5	1	5
6	61	72
7	0	0
8	2	1
9	0	4
10	27	48
11	11	35
14	0	0
16	2	2
Untypable	4	2

2. Forty-three (43) water samples were tested for Salmonella sp. and 9 (21%) were positive. In June, S. bovis morbificans was isolated from a turtle tank water sample as well as from the stools of a child handling the turtle.

   In November, S. muenchen was isolated from aquarium water and from the stools of a child playing with the turtle.

3. Sixty-five (65) well water samples obtained from treatment plants and hydrants were tested for iron bacteria, and 44 (68%) were positive.

4. A water-table obtained from a local daycare was heavily contaminated with bacteria including total coliform and P. putida.

5. Following complaints, a health inspector submitted samples from a local ethnic centre. Tests revealed Fecal Coliforms (FC) of 4,300 per 100 mL.

6. In collaboration with Agriculture Canada, the egg wash water monitoring program was continued. A total of 143 samples of eggwash water were obtained from egg wash stations using circulating egg

washers. Thirty one (22%) had unacceptable SPC (>100,000/mL) and 9 had unacceptable pH (pH >10). Egg stations using non-circulting egg washers had 81 samples tested and seven (9%) had >2 TC/100 mL.

Highlights of investigation of foodborne outbreaks

April 1990

1. Handling problems at a local Winnipeg restaurant was found to be the cause of >15,000 coagulase positive S. aureus in cooked chicken. These isolates were "B" toxin producers at significant levels.

2. A personal care home in Winnipeg had 18 persons ill, six with vomiting and ten with diarrhea. Elapsed time between eating and symptoms varied up to 24 hours. The dinner sample had coliforms, fecal coliforms and 3,125 coag. positive S. aureus. These were "C" toxin producers at 1:256 level.

June 1990

A boy scout camp in northern Manitoba had approximately 90% of its campers come down with vomiting six hours after eating tacos. Coag. positive S. aureus were found in hamburger, macaroni and cheese, chopped lettuce, and tomato. The hamburger and cheese had C and D toxin detected in the isolates. Blocking latex agglutination showed C toxin at >1:256 for both foods and D toxin to be at 1:64 for both foods. Staph isolates from the stools were A toxin producers.

Well water that had been their drinking water source had 93 total coliform and 43 fecal. Pseudomonas aeruginosa type II was isolated from the food as well.

July, 1990

Artifical cream filling used at a local bakery shops revealed several had excessive background counts and contained E. coli. Banana cream samples had 28 E. coli/gram and peach brandy had 23 E. coli/gram of filling. Non-refrigeration of these fillings was responsible for the counts. As a result, the City of Winnipeg Health Department instituted a change in the handling of these fillings.

August, 1990

1. Following complaints received by the City of Winnipeg Health department, they submitted powdered milk samples. These were taken during June to August from local senior citizen homes. The majority (28/30) had total coliforms >300,000/g. Handling practices were found to be the reason.

2. One person was attended at St. Boniface Hospital one hour after eating a taco in Winnipeg for nausea, diarrhea and chills. 100 coag. S. aureus /g were found in the food and were toxin A producers.

September, 1990

A wedding reception in rural Manitoba was the cause of eleven persons becoming ill 8 - 12 hours after eating dinner. 675 coag. positive S. aureus/gram was isolated from the turkey. Staph was also isolated from stools although neither food or stool isolates produced toxin A, B, C or D. Inappropriate food handling was the cause.

October, 1990

Two persons got ill 1¼ - 3 hours after eating pre-cooked ham purchased at a local supermarket. One person had coag. positive S. aureus isolated from the stool which was a low level A toxin and high level D toxin producer.

November, 1990

1. One person got ill four hours after eating egg salad sandwich from a local restaurant, with nausea, vomiting and chills, >1,100 fecal coliforms, 8.05 million SPC and 50 coag. positive S. aureus/gram was found in the food.

2. Following a food complaint, garlic butter was found to have >15,000/g coag. positive S. aureus which produced toxin A. Stool from complainant has S. aureus isolated, but was toxin negative.

3. One person got ill from eating crab meat at a local restaurant in St. Boniface. 50 coag. positive S. aureus/g of food were found. S. aureus C toxin at a 1:32 level was produced by these isolates.

December, 1990

One person got ill four hours after eating Chinese food with abdominal pain, nausea, vomiting and diarrhea. The chicken chow mein had 18,500 B. cereus/gram and the fried rice had 1,000 B. cereus/gram. B. cereus was also isolated from the stool.

February, 1991

1. Nausea, vomiting, abdominal cramps and diarrhea were experienced by one person 3½ hours after eating a caesar salad, 50 coag. positive S. aureus/g were isolated and were found to be B toxin producers (1:32). The stool had >1,000,000 C. perfringens per gram.

2. Tuna sandwich from a local restaurant appeared to make one person ill five hours after eating with nausea, diarrhea and cramps. 25,000 coag. positive S. aureus/g of food were isolated. Staph toxin A was detected at 1:32 level.

3. A CFB in rural Manitoba had approximately 30 persons ill after eating Chinese food in the Officer's mess hall. The shrimp served had 100 coag. positive S. aureus isolated and were found to be A (1:128) and C (1:256) toxin producers. Ottawa determined phage to be 29/52A/79;53/83A/85 RTS x 100. Twelve persons had coag. positive S. aureus isolated from their stool. Four of these were found to be A toxin producers and were phage type 29.

March, 1991

1. One person ill after eating caeser salad. 50 coag. positive S. aureus/g producing A toxin at 1:32 level found.

2. Coleslaw from a fast food (chicken) restaurant implicated in foodborne illness by PHI. Upon investigation, shredded cabbage from a commissary was found to have high fecal coliforms and 400 coag. positive S. aureus/g which produced A toxin.

3. A rural restaurant served corned beef and cream cheese sandwiches where one person became ill two hours after eating. Symptoms included cramps, vomiting, nausea and diarrhea. 50 coag. positive S. aureus were isolated/g of food. Stool samples also had coag. positive S. aureus. Neither food nor stool isolates were toxin producers. Ottawa Centre for Disease Control determined phage type for food isolate 3A/3C/55/71 + (85+) RDT x 100 and for stool isolate 3A/3C/55/71 RDT x 100.

Analysis of Food and Ice Cream

1. A total of 1,648 soft ice cream samples were received from the City of Winnipeg Health Inspection Services. 278 (17%) were unacceptable (ie SPC >100,000/g and/or TC >10/g).

   As a result, on 41 occasions the ice cream machines were shut down.

2. A total of 47 food samples were received from Medical Services of Health and Welfare Canada. Ten (21%) had unacceptable SPC (>100,000/g), 3 (6%) had unacceptable TC (>100/g) and 3 (6%) had unacceptable EC (>0/g).

3. A total of 23 samples of food from trains were received from CN/CP (Via) Rail of which 12 (52%) were unacceptable. (SPC >50,000/g and/or TC >10/g and/or EC >0/g).

Research and Development

1. Method development for the detection and isolation of Verotoxigenic E. coli (VTEC) from ground meats was continued. The sensitivity of the cell-culture based methodology was enhanced by modifying the culture procedures. Other methods, based on serological principles, were explored and work continues in this area.

2. Using the improved cell-culture based methodology, two studies were undertaken to examine the prevalence of and parameters affecting contamination of ground beef by VTEC in Winnipeg and Calgary retail outlets. (The Calgary study was done in collaboration the Health & Welfare Canada). Local results indicated an increase in prevalence over 1989, with 31% of samples contaminated by VTEC. This increase was most likely a reflection of improvements in methodology, and probably not a true increase in prevalence. Nearly 25% of VTEC isolated were of the O:157 serogroup, which has been associated with foodborne outbreaks of hemorrhagic colitis in Canada.

See also tables 7-1 to 7-5.

METABOLIC DISEASES AND PUBLIC HEALTH CHEMISTRY SECTION

In 1990/91, the Metabolic/Chemistry Section generated 1,299,791 work units.

Chemistry

The Chemistry Section continues to experience a burgeoning demand for cholesterol tests. This is due, in part, to the emphasis in both lay and medical literature of the role of elevated cholesterol levels in coronary heart disease. In cooperation with the Westman Regional Laboratory, we stress the importance of patient preparation before sampling. This results in an orderly approach to testing where there are many pre-analytical variables in operation. The goal is to provide more accurate patient diagnosis in a more economical manner. With the co-operation of Westman Lab. a common approach was developed toward lipid testing using an algorithm already in place at Cadham Provincial Laboratory. This should streamline the volume of the lipid testing in these laboratories and thus reduce overall costs. We have recently turned our attention to thyroid testing with the same goal in mind.

Our main chemistry analyzer had its data manager software updated and has the potential for an interphase with the clerical area. Once in place, this will ease and rationalize the reporting process, and the workload in the clerical area.

The chemistry section performed 63,851 tests on 41,924 samples for 306,934 work units this year. See also table 8-1.

Metabolic Screening

The Manitoba Newborn Screening Program is recognized as one of the most comprehensive on the continent. We marked its 25th anniversary of screening all newborns in the province. Newborns are tested for certain endocrine and metabolic disorders which are treatable. If undetected soon after birth they may result in serious impairment of mental and physical development. Since it was first introduced the Newborn Screening Program has seen many changes. At present we screen all newborn infants in the province for phenylketonuria, hypothyroidism, galactosemia, congenital adrenal hyperplasia and biotinidase deficiency. These are all serious diseases which require early diagnosis and treatment.

The program is reviewed regularly by an expert Advisory Committee which periodically recommends additions to, or deletions from, the program. These recommendations are based on local statistics of disease incidence, published new information about the diseases and knowledge of newborn screening programs in other parts of Canada and elsewhere.

The Advisory Committee had recently recommended that the components of the screening program that involved amino acid chromatography of blood and urine samples be discontinued. The majority of metabolic diseases that these tests have uncovered over the years are either not serious and do not require treatment, or can be readily diagnosed clinically. We therefore discontinued these tests on November 1, 1990. A revised information

pamphlet for parents will be available shortly. Up to the end of 1989, 423,064 infants had been screened since the program's inception in 1965. A total of 144 significant cases were detected for an incidence of 1:1236 infants screened. The section screened 18,033 blood specimens and 11,677 urine specimens during 1990/91. We requested 447 repeat bloods and 186 repeat urine samples up to November 1, 1990. One hundred and one (101) newborns were referred to our consultants for further investigation.

The following metabolic/endocrine disorders were detected:

Hyperphenylalaninemia	(1)
Galactosemia variant D/g	(4)
Primary Hypothyroidism	(5)
Cystinuria	(1)
Biotinidase Deficiency	(2)

The approach to neonatal thyroid testing has been changed. A fluorescent immuno assay (DELFIA) is now used as the only test, measuring the TSH (thyrotropin). The new system provides a much improved turn-around time for the detection of primary hypothyroidism.

Research and Development

The Metabolic Screening Program has pursued the direction of automated, non-isotopic analytical procedures to replace the manual radioimmunoassays (RIA) used in the section. The Maternal Serum AFP test was previously changed to micro-particle capture enzyme immunoassay on the IMX analyzer.

An evaluation of the 17-hydroxyprogesterone (17-OHP) reagents on the Delfia system will be done over the summer of 1991. If all analytical parameters of the assay, including antibody sensitivity and specificity, are adequate for the analysis of 17-OHP in neonatal blood spot specimens, we will replace the present manual RIA procedure as the screen test for Congenital adrenal hyperplasia.

Fluorescent/colorimetric microtiter plate methods are under investigation and development for the analysis of galactose, galactose-1-phosphate, phenylalanine and creatinine kinase for the detection of galactosemia, phenylketonuria and Duchenne's Muscular Dystrophy in the newborn.

In order to achieve the 1992 NCEP-LSP performance guidelines for the analysis of total cholesterol, Lab & X-ray units have adopted standardized reporting of lipid risk levels. The analytical performance of all units has been assessed through the distribution of split-specimen survey samples analyzed in parallel with the Lipid Core Lab in Toronto. Calibrator bias was identified in the manufacturer's reagent system used by some units. An alternate reagent system and calibrators are under evaluation to replace the existing reagent system in order to meet the goal of a bias $\leq 3\%$. A fresh specimen proficiency testing program for total cholesterol and triglycerides is being considered to augument the CAP program used by the LAXUS units.

The CPL and Westman Laboratory have collaborated to standardize total cholesterol measurements at both institutions in order to provide uniform cholesterol measurements for specimens referred in from Lab & X-ray units.

Thyroid function tests and their utilization are under review in the section and the evaluation of an alternate, non-isotopic ultrasensitive assay procedure for thyrotropin is pending. The evaluation of methods for free thyroxine and serum ferritin is also planned.

See also Tables 8-1 to 8-3.

The Manitoba Heart Health Project

Phase 1 of the Manitoba Heart Health Project has been completed and results from the survey of over 2,700 Manitobans indicate that risk factors for cardiovascular disease are prevalent in the population. Findings from the survey show that risk factors are more likely to be observed in middle-aged men, rural Manitobans and those in lower socioeconomic groups.

Phase II of the five year project is in progress with two pilot sites working to reduce risk factors; these are the Tupperware factory in Morden, and the community of Lac du Bonnet. Several other demonstration sites will be established over the remaining four years to examine methods to reduce cardiovascular disease.

SEROLOGY/PARASITOLOGY

The Serology section detects specific antibodies and antigens in blood samples (or CSF) submitted for the serodiagnosis of infectious or autoimmune diseases and for the assessment of the immune status of an individual.

The Parasitology section identifies parasites in faeces, urine, blood or tissues.

Dr. R. Kilani, a Parasitology graduate student working on Cryptosporidium at the CPL, obtained her Ph.D. degree from the University of Manitoba in September 1990.

A number of interesting cases were diagnosed serologically:

1. Brucellosis was detected in a 37 year old male from Chesterfield Inlet.

2. Pertussis continued to occur in all age groups. Four persons with respiratory illnesses had a seroconversion; two were from Winnipeg, both females; (age 31 and 48); one was a three year old female from Dauphin and the fourth, a one month old male from St. Theresa Point.

3. Parvovirus infections were detected in five children. The serological testing was done by Dr. J. Mahony in Hamilton, Ontario. Four children were from The Pas (age 2, 9, 9, 10) and one from Winnipeg (age 8). All had a maculo papular rash.

4. Q fever was diagnosed in a 29 year old male Winnipeg exposed to a parturient cat.

5. Two cases of Aspergillosis were diagnosed by the National Reference Centre; both were Winnipegers, a 64 year male and a 47 year old female.

6. Two cases of Toxocara were reported in males residing near the Manitoba/Ontario border, (age 6 and 39); diagnosed by the National Reference Centre for Parasitology (NRCP).

7. Four cases of Arctic Trichinosis were reported in patients from the NWT. The serological diagnosis was made by NRCP.

8. An HTLV 1/2 infection was diagnosed serologically in a 26 year old female from Japan.

9. A seroconversion to Coxsackie B virus was detected in a 12 year old female from Beausejour who had a fever and a rash.

10. For the serodiagnosis of Lyme Disease, three tests continued to be used routinely: Hillcrest IFA for IgG, IFA for IgM and ELISA (for IgG and IgM). All positive sera were tested for cross reactions with syphilis, rheumatoid factor, antinuclear factor and recent infectious mononucleosis.

Serological Testing for AIDS

Testing for HIV infections continued to be offered anonymously. The serodiagnostic program was supplemented by a seroprevalence study funded by the National Health & Developmental Research Program. The seroprevalence study preliminary results have indicated more HIV infections in Winnipeg males exposed to sexually transmitted diseases. These results have been presented to several conferences and will be published in Canadian medical journals. HIV Table 9-1 summarizes the results of the serodiagnostic program and the first year of the seroprevalence study. In the serodiagnostic program, fewer positives were reported during the last fiscal year than during the previous years. Results of tests done from April 1, 1990 to March 31, 1991 are detailed in HIV Tables 9-2 - 9-5, the breakdown by patient category is shown in Table 9-2; the breakdown by age is shown in Table 9-3; and the distribution in the various health regions in Table 9-4. Testing for HIV in Manitoba started in December 1985; a summary of the results to March 31, 1991 is presented in Tables 9-5 to 9-8.

Yearly summaries of the results are presented in Table 9-9 for each health region and in Table 9-10 for each risk factor; these last two tables show a total of 13,801 entries on 12,479 persons, as 1,322 HIV-negative persons had more than one risk factor and were counted more than once.

Research and Development (R&D)

The R & D section was very busy this year despite Wally Stackiw's impending retirement. Susan Gribben was assigned full-time to this section, under Wally Stackiw's supervision.

Collaborative Studies

1. In collaboration with Dr. Michelle Alfa of St. Boniface hospital, a total of 123 washings from bronchoscopes disinfected with CIDEX were tested for HBsAg and HIV antigen using kits obtained from Abbott Laboratories. All samples were negative.

2. In collaboration with Dr. Joanne Embree of Children's Hospital, experiments were conducted to detect HIV-1 IgA antibodies in serum and in human breast milk, using Western Blot (WB) tests obtained from Dupont and BioRad. Dupont WB was found to be more sensitive. Complete removal of IgG antibodies is necessary prior to testing for IgA. WB reveals IgA antibodies against p24 and gp160 antigens.

3. In collaboration with the City of Winnipeg entomologist, sentinel chicken sera were tested prior to and every two weeks after exposure to mosquitoes in the field. Cages were placed in five locations in Winnipeg, each cage containing ten chickens. A total of 363 sera were tested from June to August 15. Seven chickens were positive ($\geq$1:10). One horse and 24 human sera tested were negative.

4. In collaboration with Dr. Fred Aoki, serological tests were done for three different studies on Influenza viruses. A total of 1,184 sera were tested by HI and the studies reported by Aoki et al.

5. In collaboration with Dr. George Minuk, 50 samples were tested for HBV-DNA. Data were presented at an International Conference.

Kit Evaluation:

Spot tests for Infectious Mononucleosis.
The Ortho kit used by LAXUS was suddenly discontinued. Four other products were evaluated: Cellognost (Behring), Monospot (Horner), DriDot (Organon) and Serodyn Coln. Slide (Immunocorp). Monospot followed by Serodyn were selected as the best kits based on ease of reading and possible use on either serum or plasma samples.

Instrument Evaluation

Amerilite (Amersham) Hepatitis kits were evaluated using the Amerlite Analyser for the rapid detection or quantitation of an enhanced specific luminescence. For the detection of HBsAg, the assay is simple and takes only on hour; however it is not as sensitive as Abbott's ELISA.

For the detection of anti HBs and quantitation using a quantitative panel, the assay was simple and rapid, but had a poor correlation, when compared with Abbott's results.

Kits for the detection of HAV IgM and IgM anti HBc had a 100% correlation with the corresponding Abbott kits.

Lyme Disease

The following information was presented to the Manitoba Advisory Committee on Infectious Disease Control on data collected from January - November 1, 1990, and analysed using EPI Info software:

a. 22.1% of 897 persons had antibodies at the screening level detected by one or more of the 3 tests used routinely.

b. Western Blot (WB) was positive in 105 persons tested.

c. A history of tick bite was reported in 70.6% of the 361 respondents to the questionaire sent to doctors who had requested the testing.

d. Manitoba was identified as the geographic location of the tick bite in 83% of the 252 persons who answered this question.

e. An Erythema Migrans rash was seen by the physician in 28.1% of the 380 respondents.

f. Late manifestations compatible with Lyme Disease

were reported in 27.9% of the 383 respondents to the questionnaire.

Ticks

A total of 103 Dermacentor sp. ticks (84 adults, 17 nymphs and two larvae) and two Ixodes (one each of I. dammini and I. angustus) were received. Midguts were examined for spirochaetes by darkfield and cultured in BSKII media. No spirochaetes were seen or cultured.

Rodents

A total of 352 rodents were tested (300 deer mice, 31 gophers, 15 voles, four house mice and one kangaroo mouse). Kidney, spleen and ears were examined by darkfield and cultured in BSKII media. Spirochaetes were seen in two samples. Morphologically they did not resemble B. burgdorferi, they were difficult to maintain in BSKII media and did not grow in Leptospira, Treponema or Mycoplasma media.

Serological Tests

a. Three commercial ELISA kits were evaluated:
   i Kallestad (Cambridge Bioscience Corporation) kit: Forty-eight sera positive by Hillcrest ELISA were negative by this kit.
   ii General Biometrics Inc., San Diego, Immunowell: This kit uses a recombinant p39 as antigen and pre-absorption of serum with E. coli. A total of 177 sera positive by Hillcrest IFA and/or ELISA were tested. Only one person was confirmed positive by this test (positive by Hillcrest ELISA only).
   iii Whittaker Lyme STAT ELISA was evaluated against 177 sera positive by Hillcrest ELISA and negative by Immunowell ELISA. Only one serum was positive; however, the spectrophotometer used had a filter of 570 nm instead of the recommended 550 nm.

b. Twenty-seven Eskimo sera were tested by Hillcrest IFA-IgG, expecting to find them negative since there are no ticks in the North. One serum had an IFA IgG titre of 1:128.

c. **Western Blot (WB)**

A purified sonicated antigen (from an ATCC strain in the 8th passage after culture in BSKII media) was used in all gels. Antigen-antibody reaction was detected using an alkaline phosphatase conjugate and BCIP/NBT substrate.

Criteria for the interpretation of positive WB have not been standardized yet. We suggested the presence of at least four bands including key bands, ie 41, 34, and 31 kD.

A number of experiments were conducted to assess the sensitivity and specificity of WB, summarized as follows:

i Of 15 sera negative by our 3 Hillcrest screening tests, 14 had the 41 kD band, one had the 34 kD band, none had the 31 kD and all 15 sera had one to four strong bands.

ii Adsorption prior to WB were attempted:

a Adsorption with FTA-ABS sorbent did not reduce the bands detected in the 13 sera tested, indicating that the antibodies were not treponemal.

b. Adsorption of four positive sera with 1:100 suspension of B. burgdorferi, whole or sonicated, reduced the intensity of most bands (especially that of the 41 kD one), but did not eliminate them, thus suggesting the presence of non-specific antibodies.

iii Dilution of the antigen was attempted to improve the specificity of the WB. Using 12 sera positive by IFA, two antigen dilutions, ie 1:5 and 1:10 were evaluated. Dilution eliminated all the key bands (31, 34, 41 kD) in the patient's sera, as well as in the commercial positive control sera.

iv Dilution of serum was suggested to reduce the number of non-specific faint bands. Sera were tested at two different dilutions, ie 1:500 and 1:100. A commercial positive control serum had ten bands at 1:100 but at 1:500 only two bands remained visible, ie 41 and 21 kD; therefore, dilution of the serum eliminated two key bands, ie 31 and 34 kD.

v Whittaker's Accublot, a commercial WB kit was evaluated twice. In July the kit was judged unsatisfactory as the bands were smudged and not clearly separated. The kit evaluated in February 1991 was easier to read; however, partial banding or banding at an angle were noticed.

vi Microbix has produced a kit containing three purified antigens ie 31, 34 and 41 kD only. This preparation was evaluated and judged unsatisfactory as six additional bands were seen, however these bands were weaker than the key bands.

When two positive control sera, one negative control serum and 17 patient sera with IFA IgG titres of >1:128 were tested by Microbix, two commercial positive control sera and one patient serum reacted with all 3 peptide bands; two patient sera reacted with the 31 and 41 kD bands.

vii A panel of 20 quality control sera was received from Dr. Harvey Artsob of the National Reference Centre. Analysis of our results showed a good correlation with the clinical status of the patients; however one discrepancy was recorded; a negative sample was assessed as WB indeterminate.

See also Tables 9-1 to 9-22.

VIRUS SECTION

New programs and services offered this year are rapid viral diagnosis for herpes group virus infections including cytomegalovirus and herpes simplex virus. The rapid diagnosis of these infections is important in immunocompromised individuals such as patients receiving chemotherapy and for individuals in the newly opened Bone Marrow Transplantation Program at the Health Sciences Centre.

Great progress has been made in the past year in the establishment of reliable polymerase chain reaction technology for the diagnosis of human immunodeficiency virus and for papilloma virus. This technique of gene amplification, combined with hybridization methods to ensure specificity of results has made rapid advances and promises to be extremely important for the future diagnosis of viral diseases.

Studies are continuing with the improved detection of enteric adenovirus strains.

Collaborative studies with Dr. Michelle Alfa have been conducted on a new virucide. Collaborative studies on anti-herpes drugs, for both Herpes Simplex virus and Varicella zoster virus, continue with Dr. F. Aoki.

The section has been involved in the training of Infectious Disease Fellows and graduate students in the Clinical Virology Course. Dr. Duff Horne has been receiving training in viral diagnostic methods, as a clinical virology fellow for 1990/91.

The cell culture laboratory has begun the preparation of Hela cells for the Clinical Microbiology Section, for toxin detection.

See also Table 10-1.

RURAL LABORATORY AND X-RAY UNIT SYSTEM

The Rural Laboratory and X-ray Services Unit System continued to provide diagnostic services in medical laboratory technology, radiology, diagnostic ultrasound, and electrocardiography, in 74 Manitoba health facilities.

LABORATORY

Quality Control Programs:

We monitor and ensure the quality of laboratory analyses by participating in a wide range of Quality Assurance Programs.

Some are offered by our Technical Services Section:

a. A quality control program for monitoring pregnancy testing and infectious mononucleosis testing.

b. Microbiology - a comprehensive Gram staining Strep Antigen detection and sensitivity testing and culture identification Quality Control program for the participating Laboratory and X-ray Units.

Others require input from various sources:

a. Commercial Hematology control cells (internal program on all electronic cell counting apparatus).

b. The Regional Hematology Quality Control program which includes the dissemination of whole blood samples on a defined area basis and subsequent collation of area statistics.

c. Ames Urinalysis program.

d. The Fisher Diagnostics "Accutrak": computerized chemistry quality control program monitors the chemistry program.

e. All Units continue to participate in the College of American Pathologists Inter-laboratory Comparison program.

f. All Units involved with Blood Bank Procedures are monitored by the Quality Control protocol developed and administered by the Canadian Red Cross.

EASTERN REGION

New Activities:

The introduction of serum HCG is currently in progress. It is anticipated that this test will be introduced to all the Head Units and a select number of Northern Units.

We have revised the Consumable Supplies Catalogue of our Divisional Central Warehouse and distribution system. Many slow-moving and/or

obsolete items have been deleted from the catalogue. Some new products have been added which reflect the changing technology in instrumentation.

A system has been developed that streamlines our approach to the procurement of certain consumable supplies. It places the consumer in direct communication with the supplier. This process reduces wastage of a number of time-sensitive products.

The Division is now providing on-site staffing of the Diagnostic Unit at Notre Dame.

We are continuing with the policy and procedures for off-site laboratory testing. This program offers a quality control program to any hospital wishing to participate. This quality control program monitors the off-site urine dip stick and glucose monitoring tests performed by non-laboratory personnel on the hospital wards.

Upgrading of Systems:

Coulter Electronics Model T540 hematology microcell counters have been installed at the Emerson and Manitou laboratories. This instrument has whole blood sampling capability and performs five simultaneous analyses - hemoglobin, hematocrit, red cell count, white cell count and platelet counts.

A Clinitek 100 Urine Chemistry Reader was installed at Pine Falls, Pinawa, Morris, Swan Lake, Beausejour, and Ste. Anne.

A fully automated chemistry analyzer - Kodak Ektachem 500 System, has been installed at the Portage la Prairie laboratory. This system is augmented by the Lyris computer system which further enhances the analytical system and archival capabilities. This system offers a varied test menu with dry chemistry technology.

TOA Sysmex Model K-1000 whole blood microcell counters have been installed at the Beausejour, and Morris laboratories. This instrumentation has whole blood sampling capability and 8 simultaneous parameters performed.

A Ciba/Corning Ion Selective Electrode electrolyte analyzer (Model 614) was installed at the Stonewall, Emerson, Ste. Anne, and Notre Dame laboratories.

A Dupont Ion Selective Electrode sodium, potassium and lithium analyzer was installed at the Steinbach laboratory. This system has the capability of having its electrodes inter-changeable with their Dupont Dimension 380 chemistry analyzer.

A Coag-A-Mate XM coagulation timer was installed at the Morris and Carman laboratories. This unit operates on the photometric clot detection principle and is used in the performance of all routine coagulation tests.

An Abbott TDX chemistry analyzer was installed at the Selkirk laboratory on a reagent rental program. The TDX is being used as the main analytical instrument for their therapeutic drug monitoring program.

Research and Development

Following an extensive evaluation of a number of major chemistry analyzers, the Kodak Ektachem 500 was chosen as the instrument of choice for the Portage laboratory.

A urinalysis collection tube, distributed by Esbe Laboratories was evaluated by the Morris Laboratory.

The Becton Dickenson biohazard containers for vacutainor needles were evaluated the Morden laboratory.

Becton Dickenson Micro lancets and the Tenderfoot Pediatric Micro puncture devices were evaluated at the Portage laboratory.

R and D Hematology Control Cells were evaluated at the Carman and Altona laboratories.

Latex gloves from various manufacturers were evaluated at the Gimli and Morris laboratories.

The Ciba Corning blood gas controls have been evaluated at the Selkirk laboratory.

The Coulter Electronics Flexlyte 3 electrolyte analyzer was evaluated at the Morris laboratory.

The Terumo Capiject and Sarstedt microvette capillary blood collection systems have been evaluated at the Gimli and The Pas laboratories with recommendations in favour of the Terumo system.

The Ciba/Corning Model 238 Blood Gas Analyzer was evaluated at the Steinbach laboratory, with very positive recommendations.

Construction and/or Renovations

Divisional staff were involved with Manitoba Health Services Commission Planning and Construction staff and various architectural groups over the past year.

Renovations have been completed at Notre Dame. Functional programs have been completed for Beausejour, Stonewall, St. Pierre and Altona. Construction of a new facility is in progress in Vita. Beausejour and Stonewall are now in the line-drawing stage.

WESTERN REGION

The fiscal year ending March 31, 1991 saw a great deal of activity in the laboratories of the Western Region with the introduction of new procedures and instrumentation, the opening of new facilities and the planning of future facilities. Staff development, training and laboratory safety were again emphasized.

New Instrumentation

Fully automated Chemistry analyzers were installed at Roblin, Ste. Rose and Killarney.

Semi-automated systems were installed at Souris and Hamiota. Hematology systems were installed at Flin Flon, Swan River and Virden.

Semi automated Co-agglulation systems were installed at Virden, Hamiota, Ste. Rose, Roblin and Souris. The upgrading of Co-agglulation and Hematology systems was carried out at Russell, Deloraine, Minnedosa, Birtle and Baldur.

A Blood Gas analyzer was purchased for the new laboratory facility at Virden.

Semi automated Urine analyzers were installed at Flin Flon, Deloraine, Killarney and Roblin.

Construction and Planning

A new facility was opened at Virden and Benito.

Several other facilities in the region are at various stages of planning for future construction or renovation.

Laboratory Safety

Autoclaves were installed at Deloraine and Flin Flon to assure safe disposal of biological waste material. Staff attended various inter and intra departmental meetings dealing with infection control, hazards in the workplace and proper transport of dangerous goods. The Division continued to fund the costly but necessary purchase of preventative maintenance contracts from various suppliers to assure the safe and proper function of laboratory equipment.

Continuing Education

Laboratory staff again demonstrated their desire to enhance their knowledge and skills by the number of requests that were submitted to attend various educational functions. In the majority of instances, the Diivsion supported these requests by allowing time off and covering registration fees. Several commercial suppliers presented one-day seminars to regional groups on instrument specific topics.

RADIOGRAPHY - EASTERN REGION

Ongoing Programs

The total radiography examinations performed in the Eastern Region in 1990 - 91 were 104,043 exams. This figure represents a 1.0% increase when compared with the 1989 - 90 total of 102,999.

In electrocardiography, the workload was 29,984 exams for 1990 - 91, as compared to the figure of 29,090 for 1989 - 90, representing a 3% increase.

The Ultrasound total number of exams for the Eastern Region increased by 28% from 7,035 to 9,026 exams in 1990 - 91. The majority of the increase can be attributed to the opening of the new department at Portage.

An annual review has been made of the Policy and Procedure Manual. Major revisions have been made. Two new sections have been added, General Administration and Safety Policies.

Major items approved and added to the list include Sexual Harrassment in the Workplace, Computer Software Security, WHMIS and Pediatric Phlebotomy.

The Squibb "Case of the Week" program introduced last year, was very well received, and the program will be continued for the next year.

Educational programs in the x-ray discipline saw 96 staff attend several lectures on various topics.

The ongoing program of E.C.G. equipment replacement resulted in new Nihon-Kohden model 8240 E.C.G. machines being installed at Carman, Ste. Anne, Teulon, St. Claude, and Beausejour and a Mortar ELI 100 machine at Notre Dame.

No major radiographic equipment was purchased during the year. Kodak M6AN automatic film processors were purchased for the Steinbach and Portage Lab & X-ray Units. A Summit processor was purchased for the Notre Dame and a Konica QX 130 was installed at the Pinawa Unit. Refurbished wall-bucky units were installed at the Swan Lake and Winkler Units.

Planning and Construction

The Division provided input into several construction programs during the year. No new projects were added to the existing list.

The new Pembina-Manitou Hospital opened its doors in the summer of 1990. New radiographic equipment was purchased with the hospital construction program funds. Equipment included the Bennett radiographic table with A.E.C. at table and wall-bucky and an AFP 14 XL film processor.

Work continued on functional programs for new facilities at the Portage, Winkler-Morden, Altona, St. Pierre, Stonewall and Morris hospitals.

Final approvals were completed on the Beausejour Hospital. Construction has begun on the Vita Hospital with completion expected in the fall of 1991.

Project Evaluation

Three field trials and studies were carried out involving X-ray film. The first day involved assessing 400-spread films from four major manufacturers. The second study assessed 600-speed film from three companies and the third study involved a comparison of both the 400 and 600-speed systems. The results of this study and assessment and others carried out in the Western area of the Province concluded with the purchase of a 2 year contract of the Fuji HRS 400 speed structured grain technology film.

The Winkler Unit received new cassettes and screens with the latest 600-speed screens and will be a test site for the next 12 months to determine the acceptability of a province-wide 600-speed system.

The Division was also involved with an assessment of new silver reclaiming and silver recycling systems that are now available

New projects undertaken in recent months by the Division include a complete reassessment of the X-ray Requisition and Report Form to meet current and future needs.

RADIOGRAPHY - WESTERN MANITOBA

The total number of examinations performed in the western region in 1990-91 fiscal year were as follows:

Radiography, 109,894 exams. This figure has been virtually static over the last two years.

Electrocardiography, 37,666 exams; represents a decrease of 1% activity from last year.

Ultrasound, 6,231 exams, is unchanged from last year's figures.

Provincial Lab & X-ray Services continues to manage and operate the diagnostic services and facilities for the 37 rural hospitals in the western half of the province which includes, in part, as many ECG departments, four fully equipped ECG stress test labs and 48 X-ray rooms. These departments consist of 15 radiographic-fluoroscopic systems, one remote-control radiographic, fluoroscopic and tomographic suite, two operating room systems, one panorex dental unit, three tomographic rooms and 25 general duty radiography rooms.

Two new radiographic-fluoroscopic suites were purchased and installed in this fiscal year. Costs for the two systems is $400,000.

Hamiota received their system late in the fiscal year with installation to be early in the 1990-91 year. Renovations to improve work flow from the processing area to the control area and to improve patient monitoring and patient traffic are to be done in conjunction with the equipment installation.

Virden received their unit as part of the Virden District Hospital construction program which ended with the official opening on October 29, 1991. The new building gave diagnostics additional space for viewing, storage, ECG exam room, a multipurpose room, added change and washrooms, a waiting room and area chief's office.

Both systems are Shimadzu systems with UD 150 high frequency X-ray beam generation, automated radiation exposure technique selection and control (APR), multiformat spot film imaging, three-field image amplifier and closed circuit television.

Minnedosa hospital construction commenced in July, is on schedule and is expected to be open in the summer of 1991. The second daylight load film handling system in rural Manitoba will commence with the opening of this department. A Shimadzu system as described above is approved for installation as part of this project. An Ultrasound examination room is included to house the headquarters for the Yellowhead Mobile Ultrasound Service.

The Yellowhead Mobile Ultrasound Service closed down in July with the resignation of the technologist. Extensive advertising was not successful in recruiting a replacement. Service is expected to resume in September with the hiring of a new graduate.

The second Mobile Ultrasound Service in Manitoba commenced September, 1990 out of the Dauphin department. It provides direct service to Swan River, Roblin, Grandview, Winnipegosis, Ste. Rose and McCreary on varied schedules. Mrs. Cathy Nicholson is the second technologist hired in Dauphin for this service. Mr. Brian Cwir is the senior technologist. Dr. W. Fumerton is the consulting radiologist. The equipment purchased for the service is an ultramark IX from ATL Inc.. A full sized van customized with a motorized lift, electric heaters, insulation and AC power supply are planned for purchase early in the next fiscal year.

Flin Flon hospital was successful in their bid to establish an ultrasound service in their community. It was funded by a donation from "The Joe Brain Trust Foundation, Inc.". Interim service is currently being supplied from the The Pas Health Complex by Miss Daphne Vaughn, Ultrasound Technologist and Dr. Stanley Miller, Radiologist, The Pas Health Complex on a visitation basis. Marion Schwaluk, a Flin Flon staff member is currently completing her post-graduate training in Health Sciences and will begin full-time services in September.

Further to last year's evaluation and purchase of newly developed models of computer interpretive electrocardiographs, five Nihon-Kohden Units were purchased; model 8240A's were supplied to Virden, Gladstone, McCreary and Boissevain, while Swan River received a Model 8340A full-page system.

Other major capital equipment purchased included four Konica Model QX 130 film processors; one each to Hamiota, Russell, Souris and Deloraine. Prior to that Ste. Rose required an urgent replacement to their processor and received a Fuji FPM 2100. Shoal Lake also received an images 14 processor for a trial project to test a new chemical immersion system. If it tests well the product may be considered for other sites.

New hospital planning and construction activities for this year included: completion of function program and early stages of architectural plans for a new facility for Carberry.

Completion of Virden District hospital as described above.

Functional program proposals put forward for McCreary and Shoal Lake hospitals.

Early stages of architectural plans for Wawanesa hospital.

With the expiry in April 1991 of the two year contract for the Division's needs for radiographic film and processing chemistries, extensive efforts were required in evaluating proposals for the supply of goods for the next two years. As a result a contract was awarded late in the year to Innomed-Christie for the supply of Fuji hrs. type, Orthochromatic, 400 speed, rare-earth film and white mountain (Autex, 3-7-90 type) brand chemistry. The total value of the two year contract is $1,300.000.

EDUCATION

LABORATORY MEDICINE

Laboratory Medicine Education (LME) is administered and co-ordinated from the Cadham Provincial Laboratory for the entire Division by the Co-ordinator of LME.

Continued use was made of distant educational programs acquired from various sources. These programs may consist of a text, visual slides, audio-tapes, video-tapes or combination packs. Each program covers a specific topic related to laboratory medicine and may run up to one hour. The programs can be studied by individuals or in groups, at a minimum cost to the Division, and at maximum convenience to the participants. During the year, 76 staff utilized these programs.

Dr. Williams, and invited specialists, continued the Division's onsite visitations. While at these visits, formal and informal presentations are delivered to rural physicians, technologists, auxillary staff and the public. Fifty-five such presentations were made on topics such as: Respiratory Infections, Lyme Disease, Hepatitis A to E, Imaging in Rural Manitoba, Gastroenteritits, STD-Diagnosis and Therapy, Hamburger Disease, ID Update. In all 422 individuals attended: 201 physicians, 107 technologists and 114 others. The Division is highly appreciative of the contributions made by the visiting specialists.

Laboratory Assistantship Training

We continue to conduct a 12-week program to train selected Registered Radiological Technologists in basic laboratory medicine. In this program candidates receive four weeks intensive didactic training followed by eight weeks of guided practice in one of our rural Units. Six candidates graduated from this program. We are indebted to Myrla Smederovak and Rita Schmidt who conducted a large part of the didactic program and to the staff of the various Health Centres, who assisted us in the training of these students.

Inservice Training

This area of training is categorized in six distinct formats:

1. Reviews on routine procedures by on-line staff, particularly to new staff and to summer students.

2. Introduction of new tests or instruments. This may involve:

   a. Familiarization by a sales representative or senior staff.
   b. A pre-test as a guide to basic relevant knowledge
   c. Practice under supervision and guidance of an instructor.
   d. A practical test to demonstrate procedural competence.
   e. A post-test to demonstrate an understanding of principles, applications and pitfalls.

3. Lectures or seminars presented by senior staff or invited guests. These are usually broad topics of interest to all or several laboratory sections.

4. Presentation and review of current articles by designated staff members.

5. Short programs that are sent to individuals or groups, and that can be learned on-site without help from an instructor.

6. Formal programs that require indepth involvement and longer time committments from both the participant and an instructor - e.g., re-training staff.

Specific activities under categories 2, 3, and 4 are listed below. The numbers in brackets represent the number of staff in attendance at the respective session. All were one hour each unless otherwise indicated.

CPL Seminars

- Population Health and the Manitoba Center for Health Care Policy and Evaluation - Dr. N. Roos (53)

- The Evolution of the Manitoba Neonatal Metabolic Diseases Screening Program - J. G. Fox (37)

- Quality Control in Rural Manitoba - W. Strukoff, A. J. Norrie D. Fotheringham, L. Wilson (43)

- Technical Writing for Medical Scientists - Dr. Ian Carr (14)

- Epidemiology and Control of Chlamydia trachomatis in Manitoba - Dr. Pam Orr (56)

- Transport of Dangerous Goods and the Clinical Laboratory A.N.C. Delaat (51)

Other CPL Sessions

- Rapid Viral Diagnosis - G. Ahluwalia (19)

- Health Heart Survey Results - D. Gelskey (17)

- Affirmative Action Seminar - Yvette Milner (14)

- Eight Journal Reviews and Eight R&D Seminars were conducted at the CPL by our scientists on a rotations basis, 1 h/e (261)

Rural Sessions

- Introduction to WHMIS - 2 hours - to various rural staff groups (71)

- Transportation of Dangerous Goods - ditto - 1 hour (71)

- Kodak Ektachem DT60 Workshop, 6 hours (23)

- Blood Gas Monitoring, 2 hours (17)

- How to given exceptional customer service, 1 hour, Selkirk (5)

- Coulter Electronics T-series Workshop - 1 day (7)

- Laboratory Computers in the 21st Century - 5 hours (3)

- Quality Assurance, It's Up to You! - 3 hours
  - Raymond Lapace for Ames Institute (20)

- Misc Video - Lectures- Various locations - 1 hour (49)

- Coagulation - Self Study - CACLME - 15 hours -
  Winnipegosis (1)

Extramural Training for the Division

Several staff members received assistance to partake in extramural training programs, or supported themselves in such activities.

- MHO Conference - Winnipeg - 1 day - November (19)

- Certificate in Medical Laboratory Sciences, UM, several staff
  completed various courses - 30 hours/c (6)

- Inservice on Kodak DT 60 - 1 day by Kodak Rep. (3)

- CSLT Congress - Saskatoon - 1 week in June (6)

- Brandon Post-Graduate Course for Medical Laboratory
  Technologists - 1 day (39)

- Cardiology Seminar - Swan River, Portage - 1 day (15)

- Labyrithritis, Otitis Media, Ear Drums - Swan River -
  1 day (6)

- ECG Seminar - 1 day - Winnipeg (11)

- Image in Space - Kodak - 2 hours - various locations (27)

- Accounting II, Red River Community College - Selkirk -
  40 hours (4)

- Glucometer Quality Control - 4 hours - various locations (9)

- Operation of the Abbott TDX - R. Dyck, Dallas - 5 days (1)

- Operation of the Abbott Commander - C. Parsley, Dallas - 5 days (1)

- To eliminate Error Empower Technologists, Winnipeg - 2 hours
  Raymond Gambino Lecture to Manitoba Clinical Chemists (5)

Extramural Training for the Division (cont'd)

- Medical Mycology Course - University of Manitoba - 36 hours
  Wendy Kukelko, Carol Parsley (2)

- Misc - Computer Courses/Workshops - 1 day (56)

Extramural Teaching from the Division

A number of our staff continued to contribute a significant amount of their time to teaching at the University of Manitoba Medical and Dental Faculties. These activities include lectures, seminars, tutorials, rounds and laboratory sessions in a variety of health-related programs.

Some entire courses are co-ordinated by Division staff:

Radiology 103.114 - Faculty of Dentistry and Radiology 70:212 - School of Dental Hygiene, Dr. D. Gelskey - Co-ordinator and Instructor.

Clinical Virology 97:713 - University of Manitoba - Co-ordinator: Dr. G. Hammond and involving Mr. W. Stackiw, G. Ahluwalia, B. Klisko, Dr. M. Dawood and Dr. P. McNicol.

Three graduate students were being supervised by our staff:
Mr. T. Scott-Taylor, Ph.D. student by Dr. G. Hammond
Mrs. R. Kilani, Ph.D. student by Dr. L. Sekla, graduated this year. This was a first for our laboratory. Congratulations!!
Ms. Mayla Hsu, M.Sc. student by Dr. P. McNicol

Several other post-graduate students, residents and fellows rotated through various departments of the CPL for varying periods of time.

Lab rounds are a weekly feature at the CPL, and review the medical use of diagnostic technology, specimen collection, and test interpretation. Thirty rounds were conducted at the CPL for infectious disease fellows, residents, interns and medical students. The rounds were presented by: Messrs. Stackiw, Klisko, Koschik, Ahluwalia, Szajkowski and Milley, Drs. Horne, Maniar, McNicol, Mrs. Eibsich, Dzogan, Winther, Stockl, Bird, Giercke, Drummond, Parsley and Miss Pugh.

Some other activities of note:

- Delaat, A.N.C. and Giercke, S.

  - Orientations to Federal Nurses

- Dzogan, S.

  - Specimens related to foodborne diseases, Canadian Institute of Health Inspectors, Winnipeg, May 1990.

- Orientation Sessions, Regional Director Group - Department of Environment - Manitoba, September 1990.

- Presentations to Student Health Inspectors and to Manitoba Water and Waste School Students.

- Eibisch, G.

  - Viral Serology in the Nineties, Winnipeg Academy - MSMLT, February, 1991.

- Hammond, G.W.

  - Influenza Epidemiology, Community Health Sciences, Course 93:707.
  - Med I, II and III lectures.

- Jones, N.

  - Collection of Laboratory Specimens, Home Care Group - Swan River District.

- Mawhinney, H.

  - Approaches to Viral Diagnoses, Post-graduate Course for Medical Technologists, Brandon, October, 1990.

- McNicol, P.

  - Diagnostic Biotechnology, Red River Community College - April, 1990.

  - Laboratory Diagnosis of Infectious Diseases, Biology Teachers Organization of Mantioba, May 1990.

  - Human Papillomavirus, University of Winnipeg, Seminar Series, February, 1991.

  - Dr. McNicol also served as Course Director Med I - Infectious Diseases, and as lecturer in various other courses at the U. of M.

- Milley, D.

  - Enterohemorrhagic E. coli, Food Sciences Seminar Series, the U. of M., April 1990.

  - Food Safety Course - Lecturer - U. of M.

  - Health Protection Branch - Workshop Presentations: Manitoba Studies on the Isolation of E. coli 0157:H7 from Ground Beef, Ottawa, March 1991.

- Norrie, A.J. and Kines, K.

  Inservice to Winnipeg South Public Health Nurses.

- Phippen, D.

  - Universal Precautions, Winnipeg Academy, MSMLT, February, 1991.

- Sekla, L., Gray, M., Klisko, B., Giercke, S., Winther, W. and Dawood, M.

  Orientations to Winnipeg and Manitoba STD Nurses.

- White, G.

  - Glucometer Evaluation Procedures, various groups, Dauphin District.

- Williams, T.

  - Diphtheria and other toxins, Post-graduate Course for Medical Technologists, Brandon, October 1990.

Distinguished Visitors

- Dr. Donald E. Woods, Acting Head, Microbiology and Infectious Diseases, University of Calgary, met with senior CPL staff to discuss common interests - February, 1991.

- Dr. J. David Hilton, Chief, Department of Cardiology, Royal Columbian Hospital, New Westminster, B.C., presented the J.C. Wilt Lecture: Cholesterol Testing - Is there a Consensus?

- A group of Westman Laboratory Staff participated in a Seminar Day at the CPL, which was conducted by misc. CPL and LAXUS staff.

Career Counselling and Development

- Manitoba School Science Symposium - 17 students visted the CPL as part of the May final.

- Messr. A.N.C. Delaat, and M. Gray served as judges to evaluate science projects and participants.

- Career Presentations were conducted at:
  - West Kildonan Collegiate - March 1990
  - Hugh John MacDonald School - January 1990
  - Manitoba Career Symposium - February 1990 - (4 times)
  - George McDowell School - March 1990
  - Two students from Ste. Anne Collegiate spent one week at the CPL to explore career opportunities.
  - Several summer students, individuals and associations received councilling or consultation in person or over the phone.

- Extended inservices to Central Medical technologist and Red River Community College faculty - S. Giercke and W. Winther.

RADIOGRAPHY

R.T. Training

The Manitoba Health Services Commission X-ray Training School continued its program of training candidates for registration with the Canadian Association of Medical Radiation Technologists. The program involves 25 months of X-ray training plus three months of Laboratory Assistant Training.

Three candidates passed registration examination. Also, four senior students are progressing successfully through the clinical portion of the program in both rural and city hospitals.

Four junior students are currently enrolled in the theoretical portion of the program at Red River Community College, and are doing extremely well.

The program consists of two four-month blocks of theory at R.R.C.C., separated by one month of clinical experience in a rural hospital. The final block of theory is followed by return to the rural hospitals for fifteen months of second year clinical training. In addition, four former X-ray R.T.'s were retrained in order to be re-instated with their professional association.

X-ray Assistant Training

The Lab & X-ray Unit System sponsors selected Registered Medical Laboratory Technologists in a four month X-ray Assistant Training Program. This course is designed to train individuals to assist Radiological Technologists in covering emergency call-back situatins in smaller rural hospitals. Five students successfully completed the 1990 program.

Continuing Education

A number of inservice seminars, and workshops as well as extramural lectures and conferences were attended by Divisional staff.

The following topics were covered at the respective locations with the figures in brackets representing the number of individuals in attendance.

Location	Topic	Attendance
Brandon	Clinical problems and Sensitometric Solution - (1 hour)	(9)
	Quality Control - 1 hour	(9)
	Acupuncture - 1 hour	(9)
	Angioplasty of Vascular System - 1 hour	(9)
	Mamography - 1 hour	(9)
	Clot Imaging - 1 hour	(9)
	Child Abuse - 1 hour	(9)
	C.T. of Brain - 1 hour	(9)

Winnipeg	Tour of MRI facility - 1.5 hour	(6)
Brandon	High Frequency Generators - 1 hour	(15)
Winnipeg	Program Evaluation - 4 days	(1)
Saskatoon	Many topics - 1 week	(3)
Chicago	Many topics - 1 week	(1)
Morden	Radiographic Imaging - 2 hours	(25)
Selkirk	Images in Space - 2 hours	(24)
Winkler	Images in Space - 2 hours	(23)
Selkirk	Radiographic Imaging - 2 hours	(24)
Swan River	C.T. Basics - 3 hours	(3)
	Radiology - C. Spines, C.T. scans - 6 hours	(4)
	Chest X-rays - 2 hours	(4)
	Skull radiography; Trauma Radiography - 2 hours	(12)

Ultrasound

Winnipeg	Total 4.5 credit hours Gastrointestinal Tract Ultrasound and other Imaging modalities Ultrasound of the Scrotum Ultrasound Challenge New Concepts in Fetal Movement	(6)

Electrocardiography

Winnipeg	10 topics - 5 hours	(6)

EXTERNAL COMMITTEE ACTIVITIES OF STAFF - 1990/1991

Many of our staff members serve on various health related committees by providing advisory, consultative or executive functions:

Mrs. P. Bird	- Treasurer - Manitoba Society of Medical Laboratory Technologists
Mr. J. D. Brownlee	- Parlimentarian - Manitoba Association of Medical Radiological Technologists
	- Secretary - Faculty Liaison Committee
Mr. M. W. Burroughs	- Member - Medical Radiological Technology Advisory Committee, Red River Community College
	- Secretary - Provincial Ultrasound Advisory Committee
Mr. A.N.C. Delaat	- Continuing Education Director - Manitoba Society of Medical Laboratory Technologists
	- Chairman - Steering Committee - Degree in Medical Laboratory Sciences in Manitoba
	- Member - Advisory Committee - Medical Laboratory Technology Program, Red River Community College
Dr. J. G. Fox	- Chairman - Perinatal Screening Committee
	- Member - Alpha Feto Protein Consultant's Group
	- Member - Biohazard Committee
	- Member - Manitoba Advisory Committee on Infectious Diseases (MACID)
	- Member - Diagnostic Services Review Committee - Manitoba Health
Dr. D. Gelskey	- Chairman - Education Committee, Manitoba Heart and Stroke Foundation
	- Member - Grant Screening Committee, Manitoba Cancer Society
	- Member - Manitoba Hypertension Coalition Steering Committee
	- Member - Undergraduate of Medical Education Committee, University of Manitoba

Dr. D. Gelskey cont'd	- Member - Working Committee for World Health Organization Collaborating Center, University of Manitoba
	- Chairman - Hypertension Action Plan Working Committee
Mrs. S. Giercke	- Membership Director, Manitoba Society of Medical Laboratory Technologists
Ms. T. Greenlay	- Director - Manitoba Association of Cardiology Technologist
Dr. G. W. Hammond	- Member - National Advisory Committee on Immunization
	- Member - Technical Advisory Committee and Chairman of the Subcommittee on Reference Services to Laboratory Centre for Disease Control, Ottawa
	- Member - Examination Committee, and Specialty Committee in Medical Microbiology, Royal College of Physicians and Surgeons of Canada
	- Member - Manitoba Advisory Committee on Infectious Diseases
	- Member - Board of Directors and Awards Assessment Committee, Manitoba Medical Services Foundation Inc.
	- Ad Hoc Member, Minister's Advisory Committee on AIDS, Manitoba
	- Member - Executive Council, Canadian Infectious Disease Society
Dr. P. McNicol	- Member - National Committee for Human Papillomavirus Research, Health & Welfare, Canada
	- Member - Infectious Diseases Subject Committee, University of Manitoba
	- External Reviewer - Medical Research Council, Canada, B.C. Health Care Research Foundation
Mrs. S. Normand Mrs. A. Norrie	- Members - Advisory Council, Medical Laboratory Technology Program - Red River Community College
Mrs. A. Norrie	- Chairperson - Scientific Program Committee Academy Action, MSMLT

Ms. D. Phippen	- Steering Committee for Infection Control Guidelines. Bureau of Communicable Disease Epidemiology, Laboratory Centre for Disease Control, Health & Welfare Canada.
	- Member Manitoba Advisory Committee on Infection Control - Infection Control Subcommittee
	- Community and Hospital Infection Control Association (CHICA) - Manitoba
	- St. Amant Centre - Infection Control Committee
Dr. L. Sekla	- Preventive, Environmental & Occupational Health, Manitoba Medical Association
	- Senior Health Official, Environmental Health Protection, Health & Welfare Canada
	- Member - Manitoba Advisory Committee on Infectious Diseases
Mr. W. Stackiw	- Animal Care Committee, University of Manitoba
Mr. W. Strukoff	- Member - Disciplinary Committee - Canadian Society Laboratory Technologists
Mrs. E. Stockl	- Member - Maternal Serum AFP Advisory Group and Working Committee
Mr. R. Thompson	- Member - Maternal Serum AFP Advisory Group
Dr. T. Williams	- Member - Manitoba Advisory Committee on Infectious Diseases
	- Member - Program Review Committee, CP&S
	- Member - Standing Committee on Medical Manpower - MHSC

PUBLICATIONS

1. Caul, E., Ashley C., Curry, A., and Sekla, L. Foodborne gastroenteritis due to Norwalk virus in a Winnipeg hotel. Canada Med. Assoc. J., 142:290, 1990.

2. Fox, J.G. A Historic Pamphlet "Cadham Provincial Laboratory" was updated and reissued to cover 1897-1990.

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16. Scott-Taylor, T., Ahluwalia, G., Klisko, B., Hammnd, G.W. Prevalent Enteric Adenovirus Variant Not Detected by Commercial Monoclonal Antibody Enzyme Immunoassay. J. Clin. Microbiol. 28(12):2797-2801, 1990.

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18. Sekla, L. Serodiagnosis of HIV in Manitoba. Can. Dis. Wk. Review, 14:#2,5-7, 1988.

19. Sekla, L., and Stackiw, W. Problems in interpreting serological markers in the diagnosis of HIV infections in regions of low endemicity. Archives of AIDS Research, 1:343-352, 1988.

20. Sekla, L. Food-related illnesses: Some current concerns. Manitoba Medicine, 59:32-33, 1989.

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8. Sekla, L., Stackiw, W., Hammond, G., Eibisch, G. and Ross, D. Serological testing for Hepatitis C in Manitoba. Presented at the Conjoint Meeting on Infectious Diseases, Toronto, Ontario, November 26-28, 1990.

Table 1 Cadham Provincial Laboratory Workload Statistics 1990-91

	1989 - 1990			1990 - 1991		
	NO. OF SPECIMENS	NO. OF TESTS	STATISTICS CANADA UNITS	NO. OF SPECIMENS	NO. OF TESTS	STATISTICS CANADA UNITS
Clinical Microbiology	116,675	147,463	2,416,970	117,987	149,842	2,266,556
Media	N/A	N/A	361,906	N/A	N/A	369,699
Virus Detection	14,819	20,224	863,670	14,809	19,578	816,864
Environmental Microbiology	46,283	81,432	1,246,761	46,369	78,622	1,323,885
Serology/Parasitology	87,615	218,182	3,395,371	96,035	238,570	3,711,774
Metabolic/Chemistry	86,197	267,515	1,457,124	89,481	232,124	1,228,003
TOTALS	351,589	735,816	9,379,896	364,681	718,736	9,347,082

NOTE: Serology Prenatal Test Totals: 22,136

Table 2

WORKLOAD OF RURAL LAB & X-RAY UNITS SYSTEM - APRIL 1, 1990 - MARCH 31, 1991

UNIT	TOTAL ECG EXAMINATIONS TOTAL	I/P/AT	O/PAT	TOTAL ECG S.C. UNITS TOTAL	I/P/AT	O/PAT
RUSSELL	1,160	426	734	31,631	12,981	18,650
BIRTLE	671	209	462	18,598	6,490	12,108
ROSSBURN	714	205	509	20,340	6,826	13,514
SWAN LAKE	692	258	434	20,008	8,484	11,524
DAUPHIN	6,217	2,403	3,814	176,540	73,260	103,280
GILBERT PLAINS	191	0	191	3,378	0	3,378
GRANDVIEW	501	116	385	14,090	3,856	10,234
MCCREARY	660	223	437	19,136	7,214	11,922
ROBLIN	1,519	631	888	43,449	20,174	23,275
STE. ROSE	1,122	339	783	31,735	10,422	21,313
WINNIPEGOSIS	380	260	120	11,184	8,008	3,176
NELSON	2,548	849	1,699	71,824	26,148	45,676
CARBERRY	598	135	463	16,924	4,550	12,374
ERICKSON	394	133	261	11,638	4,356	7,282
GLADSTONE	433	128	305	11,664	3,720	7,944
MINNEDOSA	794	332	462	22,700	9,952	12,748
PORTAGE	3,091	959	2,132	93,987	31,113	62,874
MACGREGOR	173	23	150	4,602	572	4,030
N.D.C.	127	127	0	3,398	3,398	0
NOTRE DAME	293	113	180	8,386	3,570	4,816
ST. CLAUDE	271	75	196	7,342	2,246	5,096
TREHERNE	376	130	246	10,692	4,308	6,384
KILLARNEY	1,267	596	671	35,238	17,016	18,222
BALDUR	176	111	65	5,464	3,774	1,690
BOISSEVAIN	799	293	506	22,679	9,612	13,067
CARTWRIGHT	47	3	44	1,246	102	1,144
CRYSTAL CITY	673	291	382	18,178	8,404	9,774
DELORAINE	928	405	523	27,040	13,442	13,598
MELITA	502	246	256	14,796	8,012	6,784
MORDEN	1,750	537	1,213	45,626	16,235	29,391
ALTONA	719	155	564	22,936	5,826	17,110
CARMAN	1,162	437	725	32,294	13,488	18,806
EMERSON	199	53	146	5,638	1,802	3,836
MANITOU	337	71	266	8,850	2,316	6,534
MORRIS	841	336	505	27,628	14,040	13,588
SWAN LAKE	1,234	172	1,062	31,795	4,438	27,357
WINKLER	1,619	1,057	562	45,598	30,114	15,484
SELKIRK	2,733	877	1,856	81,918	26,744	55,174
BEAUSEJOUR	883	464	419	25,664	14,579	11,085
LAC DU BONNET	651	0	651	15,463	0	15,463
PINAWA	557	188	369	16,250	6,384	9,866
PINE FALLS	940	455	485	26,456	13,838	12,618
SELKIRK M.H.C.	277	251	26	8,242	8,242	0
WHITEMOUTH	160	76	84	4,160	1,976	2,184
SWAN RIVER	2,366	693	1,673	61,748	18,407	43,341
BENITO	141	46	95	3,688	1,218	2,470
GIMLI	2,082	601	1,481	60,940	20,170	40,770
ERIKSDALE	271	88	183	8,534	3,256	5,278
RIVERTON	141	0	141	4,794	0	4,794
STONEWALL	1,323	314	1,009	39,854	11,488	28,366
TEULON	894	323	571	25,952	11,106	14,846
VIRDEN	1,262	251	1,011	34,539	8,439	26,100
WAKOTA	846	275	571	23,940	9,070	14,870
RESTON	411	135	276	11,979	4,568	7,411
RIVERS	583	138	445	16,550	4,404	12,146
SOURIS	1,719	475	1,244	48,658	16,150	32,508
ARBORG	510	260	250	16,512	8,840	7,672
ASHERN	363	83	280	9,438	2,158	7,280
CHURCHILL	422	168	254	11,964	5,200	6,764
FLIN FLON	2,655	614	2,041	77,038	20,876	56,162
GILLAM	167	70	97	4,790	2,260	2,530
GLENBORO	434	126	308	11,855	4,139	7,716
LEAF RAPIDS	128	10	118	3,669	340	3,329
LYNN LAKE	89	28	61	2,421	779	1,642
ST. PIERRE	666	332	334	18,485	9,801	8,684
STE. ANNE	692	329	363	20,056	10,330	9,726
SNOW LAKE	128	17	111	3,328	442	2,886
STEINBACH	3,078	711	2,367	85,287	24,146	61,141
SUNDANCE	28	0	28	312	0	312
THE PAS	3,409	1,273	2,136	107,201	40,538	66,663
VITA	982	250	732	27,662	8,604	19,058
WANANESA	509	83	426	13,878	2,622	11,256
TOTAL ECG EXAMS=			67,678	TOTAL ECG SC UNITS=		1,931,477
TOTAL ECG IN/PAT EXAMS			22,841	TOTAL ECG SC IN/PAT=		721,383
TOTAL ECG OUT/PAT EXAM			44,837	TOTAL ECG SC OUT/PAT=		1,210,094

Table 3

WORKLOAD OF RURAL LAB & X-RAY UNITS SYSTEM - APRIL 1, 1990 - MARCH 31, 1991

UNIT	TOTAL S.C. UNITS			TOTAL LABORATORY TESTS		
	TOTAL	IN/PAT	O/PAT	TOTAL	IN/PAT	O/PAT
RUSSELL	162,624	54,596	108,028	69,141	23,908	45,233
BIRTLE	142,061	42,621	99,440	28,283	8,689	19,594
ROSSBURN	150,743	37,646	113,097	32,765	8,717	24,048
SWAN LAKE	110,046	32,679	77,367	21,623	6,668	14,955
DAUPHIN	1,023,950	296,139	727,811	329,149	105,092	224,057
GILBERT PLAINS	11,434	0	11,434	1,637	0	1,637
GRANDVIEW	97,102	23,478	73,624	21,590	5,384	16,206
MCCREARY	125,258	38,411	86,847	23,964	7,805	16,159
ROBLIN	247,840	77,528	170,312	63,593	20,955	42,638
STE. ROSE	283,681	112,469	171,212	63,383	25,894	37,489
WINNIPEGOSIS	67,509	34,968	32,541	14,253	7,081	7,172
BEAUSEJOUR	340,144	104,737	235,407	116,073	38,025	78,048
CARBERRY	115,961	29,598	86,363	18,282	4,826	13,456
ERICKSON	91,435	27,412	64,023	16,851	5,225	11,626
GLADSTONE	107,387	31,266	76,121	25,489	8,000	17,489
MINNEDOSA	163,234	56,925	106,309	26,642	9,504	17,138
PORTAGE	854,214	292,333	561,881	190,091	66,813	123,278
MACGREGOR	19,452	1,394	18,058	4,381	310	4,071
N.D.C.	0	0	0	0	0	0
NOTRE DAME	103,827	31,062	72,765	33,847	9,377	24,470
ST. CLAUDE	48,826	14,240	34,586	12,775	3,983	8,792
TREHERNE	113,071	36,042	77,029	34,085	11,356	22,729
KILLARNEY	291,222	88,883	202,339	72,955	25,238	47,717
BALDUR	58,326	28,432	29,894	9,246	4,519	4,727
BOISSEVAIN	184,897	40,880	144,017	29,705	6,844	22,861
CARTWRIGHT	27,890	3,068	24,822	5,321	579	4,742
CRYSTAL CITY	199,929	49,107	150,822	45,226	11,546	33,680
DELORAINE	214,155	61,535	152,620	42,387	13,343	29,044
MELITA	98,613	30,014	68,599	18,361	5,537	12,824
MORDEN	501,527	120,220	381,307	109,620	24,986	84,634
ALTONA	205,055	56,539	148,516	37,432	10,698	26,734
CARMAN	210,248	91,290	118,958	41,282	17,422	23,860
EMERSON	54,706	14,738	39,968	9,932	2,730	7,202
MANITOU	78,494	16,274	62,220	13,070	3,042	10,028
MORRIS	228,604	84,420	144,184	78,439	29,585	48,854
SWAN LAKE	289,027	80,925	208,102	63,286	17,260	46,026
WINKLER	238,888	125,084	113,804	38,047	20,075	17,972
SELKIRK	830,132	166,857	663,275	199,539	55,982	143,557
BEAUSEJOUR	98,410	67,891	30,519	28,572	20,053	8,519
LAC DU BONNET	84,910	0	84,910	19,470	0	19,470
PINAWA	100,704	31,960	68,744	32,621	10,949	21,672
PINE FALLS	213,228	91,375	121,853	55,046	23,933	31,113
SELKIRK M.N.C.	0	0	0	0	0	0
WHITEMOUTH	20,628	10,813	9,815	5,197	2,684	2,513
SWAN RIVER	422,645	143,300	279,345	84,722	30,395	54,327
BENITO	11,740	4,292	7,448	2,148	807	1,341
GIMLI	294,562	70,978	223,584	92,305	24,333	67,972
ERIKSDALE	41,816	13,155	28,661	11,728	3,774	7,954
RIVERTON	0	0	0	0	0	0
STONEWALL	202,978	54,142	148,836	59,649	16,014	43,635
TEULON	193,493	49,516	143,977	44,082	13,025	31,057
VIRDEN	214,773	43,734	171,039	63,549	15,421	48,128
MANIOTA	174,147	50,323	123,824	52,728	15,960	36,768
RESTON	75,575	21,739	53,836	15,358	4,278	11,080
RIVERS	162,562	42,557	120,005	41,368	11,254	30,114
SOURIS	215,179	73,034	142,145	76,388	27,764	48,624
ARBORG	104,932	26,300	78,632	28,960	8,539	20,421
ASHERN	92,275	19,643	72,632	18,277	4,208	14,069
CHURCHILL	314,465	90,939	223,526	69,913	23,436	46,477
FLIN FLON	547,621	185,392	362,229	175,836	64,718	111,118
GILLAM	74,607	19,104	55,503	14,831	4,273	10,558
GLENBORO	89,298	20,111	69,187	20,049	4,751	15,298
LEAF RAPIDS	75,591	9,922	65,669	14,587	2,196	12,391
LYNN LAKE	66,247	25,442	40,805	12,905	4,935	7,970
ST. PIERRE	122,330	45,512	76,818	26,539	10,722	15,817
STE. ANNE	153,398	69,544	83,854	39,165	17,464	21,701
SNOW LAKE	32,658	4,182	28,476	5,878	645	5,233
STEINBACH	473,078	138,511	334,567	163,416	45,830	117,586
SUNDANCE	0	0	0	0	0	0
THE PAS	986,888	450,979	535,909	218,739	93,153	125,586
VITA	112,041	27,118	84,923	26,707	6,772	19,935
WANANESA	83,413	9,721	73,692	15,756	1,867	13,889

TOTAL LAB SC UNITS=	13,947,704	TOTAL LAB TESTS =	3,498,234
TOTAL IN/PAT UNITS=	4,345,039	TOTAL IN/PAT TESTS =	1,141,151
TOTAL OUT/PAT UNITS=	9,602,665	TOTAL OUT/PAT TESTS=	2,357,083

Table 4

WORKLOAD OF RURAL LAB & X-RAY UNITS SYSTEM - APRIL 1, 1990 - MARCH 31, 1991

UNIT	TOTAL ULTRASOUND EXAMS TOTAL	IN/PAT	O/PAT	TOTAL US S.C. UNITS TOTAL	IN/PAT	O/PAT
DAUPHIN	2,952	327	2,625	126,727	14,407	112,320
GRANDVIEW	45	0	45	1,898	0	1,898
MCCREARY	57	6	51	2,457	260	2,197
ROBLIN	122	14	108	5,168	555	4,613
STE. ROSE	111	7	104	4,724	321	4,403
WINNIPEGOSIS	38	9	29	1,710	432	1,278
PORTAGE	1,586	163	1,423	69,473	7,264	62,209
SELKIRK	2,564	150	2,414	113,891	6,884	107,007
STEINBACH	1,917	116	1,801	77,558	4,818	72,740
SWAN RIVER	310	32	278	13,621	1,410	12,211
THE PAS	1,863	223	1,640	79,848	9,619	70,229
WINKLER	2,959	210	2,749	149,115	9,485	139,630
FLIN FLON	214	20	194	9,007	925	8,082
MINNEDOSA	168	5	163	7,384	240	7,144
RUSSELL	171	9	162	7,654	528	7,126
NEEPAWA	180	11	169	7,932	575	7,357

TOTAL US EXAMS =	14,884	TOTAL US SC UNITS=	662,210
TOTAL US IN/PAT EXAMS=	1,266	TOTAL US SC UNITS IN/PAT=	56,155
TOTAL US OUT/PAT EXAMS=	13,618	TOTAL US SC UNITS OUT/PAT=	606,055

Table 5

WORKLOAD OF RURAL LAB & X-RAY UNITS SYSTEM

	TOTAL X-RAY EXAMINATIONS 1990/91			TOTAL S.C. UNITS 1990/91		
UNIT	TOTAL	IN/PAT	O/PAT	TOTAL	IN/PAT	O/PAT
RUSSELL	2,934	552	2,382	96,119	24,289	71,830
BIRTLE	1,858	384	1,474	57,508	14,044	43,464
ROSSBURN	1,451	251	1,200	31,656	5,570	26,086
SHOAL LAKE	1,603	319	1,284	39,047	9,169	29,878
DAUPHIN	14,192	2,580	11,612	567,721	115,328	452,393
GILBERT PLAINS	417	0	417	9,235	0	9,235
GRANDVIEW	1,654	254	1,400	41,429	8,127	33,302
MCCREARY	955	218	737	22,931	5,707	17,224
ROBLIN	2,946	894	2,052	75,329	27,504	47,825
STE. ROSE	4,496	630	3,866	116,199	19,202	96,997
WINNIPEGOSIS	883	322	561	19,076	6,999	12,077
NEEPAWA	4,877	970	3,907	165,990	40,532	125,458
CARBERRY	1,278	172	1,106	31,249	5,129	26,120
ERICKSON	1,627	248	1,379	38,173	6,704	31,469
GLADSTONE	1,591	244	1,347	49,322	8,023	41,299
MINNEDOSA	2,624	419	2,205	96,515	16,826	79,689
PORTAGE	11,708	2,314	9,394	394,947	78,978	315,969
MACGREGOR	393	36	357	9,123	1,274	7,849
M.D.C.	1,292	1,203	89	29,963	27,954	2,009
NOTRE DAME	1,058	146	912	25,119	4,626	20,493
ST. CLAUDE	790	136	654	20,871	5,090	15,781
TREHERNE	1,367	197	1,170	49,870	8,014	41,856
KILLARNEY	4,262	771	3,491	132,255	29,131	103,124
BALDUR	394	145	249	11,078	5,370	5,708
BOISSEVAIN	2,390	365	2,025	54,585	9,484	45,101
CARTWRIGHT	193	11	182	4,230	384	3,846
CRYSTAL CITY	1,278	262	1,016	33,348	7,754	25,594
DELORAINE	3,278	572	2,706	91,363	19,861	71,502
MELITA	2,122	381	1,741	51,925	12,586	39,339
MORDEN	5,188	1,299	3,889	183,858	48,699	135,159
ALTONA	3,110	453	2,657	100,247	16,438	83,809
CARMAN	4,796	1,229	3,567	163,274	45,093	118,181
EMERSON	609	106	503	13,223	2,267	10,956
MANITOU	1,344	178	1,166	28,734	4,680	24,054
MORRIS	2,521	565	1,956	67,911	17,914	49,997
SWAN LAKE	3,303	495	2,808	107,867	19,556	88,311
WINKLER	4,802	1,295	3,507	239,887	58,060	181,827
SELKIRK	12,013	1,330	10,683	393,936	43,985	349,951
BEAUSEJOUR	4,538	719	3,819	147,433	28,466	118,967
LAC DU BONNET	1,680	0	1,680	37,954	0	37,954
PINAWA	1,822	322	1,500	57,586	12,463	45,123
PINE FALLS	3,528	1,175	2,353	87,231	28,514	58,717
SELKIRK M.H.C.	790	790	0	23,220	22,246	974
WHITEMOUTH	466	192	274	12,746	6,830	5,916
SWAN RIVER	7,183	1,398	5,785	274,901	52,211	222,690
BENITO	383	72	311	13,327	2,516	10,811
GIMLI	5,222	659	4,563	158,389	27,964	130,425
ERIKSDALE	1,078	152	926	26,462	4,772	21,690
RIVERTON	231	0	231	4,589	0	4,589
STONEWALL	3,180	519	2,661	78,429	15,881	62,548
TEULON	3,130	467	2,663	119,835	20,059	99,776
VIRDEN	3,573	517	3,056	109,691	19,703	89,988
HAMIOTA	2,411	374	2,037	66,443	10,884	55,559
RESTON	1,078	229	849	27,956	7,607	20,349
RIVERS	1,560	258	1,302	37,244	6,905	30,339
SOURIS	2,932	605	2,327	75,511	16,848	58,663
ARBORG	2,263	365	1,898	53,337	12,792	40,545
ASHERN	1,291	104	1,187	29,276	3,005	26,271
CHURCHILL	1,638	490	1,148	54,816	13,796	41,020
FLIN FLON	10,104	1,381	8,723	254,412	37,352	217,060
GILLAM	889	106	783	20,642	3,671	16,971
GLENBORO	956	196	760	23,613	6,883	16,730
LEAF RAPIDS	883	49	834	26,619	1,667	24,952
LYNN LAKE	690	224	466	18,245	7,389	10,856
ST. PIERRE	3,065	666	2,399	104,231	27,817	76,414
STE. ANNE	4,475	672	3,803	128,921	26,136	102,785
SNOW LAKE	626	12	614	7,174	125	7,049
STEINBACH	8,537	1,109	7,428	272,883	36,661	236,222
SUNDANCE	166	0	166	3,510	0	3,510
THE PAS	17,107	2,668	14,439	570,919	89,875	481,044
VITA	1,917	343	1,574	46,346	10,274	36,072
WANANESA	1,105	137	968	25,240	3,858	21,382

TOTAL X-RAY EXAMS=	214,094	TOTAL SC UNITS=	6,664,244
TOTAL X-RAY IN/PAT EXAMS=	38,916	TOTAL SC IN/PAT UNITS=	1,345,521
TOTAL X-RAY OUT/PAT EXAMS=	175,178	TOTAL SC OUT/PAT UNITS	5,318,723

CLINICAL MICROBIOLOGY - CPL

TABLE 6.1. RESPIRATORY ISOLATES

	NUMBER OF ISOLATES	
A. RESPIRATORY	1988/89	1990/91
C. diphtheria		
gravis toxigenic	16	4
gravis non-toxigenic	32	36
mitis toxigenic	1	0
mitis non-toxigenic	37	16
intermedius non-toxigenic		3
B. pertussis	42	33
Acid Fast Bacilli		
positive culture	72	58
positive smears	21	10
Legionella:		
L. pneumophila	3	2

TABLE 6.2. MYCOLOGY ISOLATES

	NUMBER OF ISOLATES	
C. STD	1988/89	1990/91
N. gonorrhoea	818	384
C. trachomatis	4509	4273
T. vaginalis	175	100

TABLE 6.3. STD ISOLATES

	NUMBER OF	
	1988/89	1990/91
Presumptive Tinea versicolor	20	28
Candida albicans	844	1030
Dermatophytes	106	114
Blastomyces dermatidis	6	2

TABLE 6.4. MISCELLANEOUS ISOLATES

	NUMBER OF ISOLATES	
D. MISCELLANEOUS	1988/89	1990/91
C. difficile non-toxigenic	58	54
C. difficile toxigenic	81	68
Streptococcus Group A	929	965
Streptococcus Group B	453	549
N. meningitidis	30	21
L. monocytogenes	2	1
H. ducreyi	---	0
C. difficile cytotoxin	269	322
Verotoxin	118	65

TABLE 6.5 - ENTERIC ISOLATES

E. ENTERICS	NUMBER OF ISOLATES 1989/90	1990/91
Escherichia Coli Group:		
08:K25	1	1
026:K60	14	10
055:K59	15	7
086a:K61	3	5
0111:K58	1	11
0119:K59	5	6
0125:K70	15	3
0126:K71	6	7
0127a:K63	3	2
0128:K67	30	20
0124:K72	1	0
018A018C:K77	0	0
0157:H7	114	59
075:Non-motile		0
Campylobacter fetus ss jejuni	106	88
Yersinia entercolitica	13	28
Aeromonas hydrophilia	160	125
Plesiomonas shigelloides	11	11
Shigella		
S. boydii I sero II		0
S. boydii II sero 14	4	0
S. boydii 4		1
S. flexneri 1	11	2
S. flexneri 2	54	15
S. flexneri 6	1	3
S. flexneri Y		1
S. flexneri X	0	0

	NUMBER OF ISOLATES 1989/90	1990/91
Shigella		
S. sonnei	16	13
S. dysenteriae sero 1		0
S. dysenteriae sero 2		0
S. dysenteriae sero 3		0
Sh. species		11
Salmonella		
S. agona	25	11
S. albany		2
S. anatum		1
S. arizona	1	0
S. berta		
S. blockley	4	9
S. bonariensis		1
S. bovis morbificans	6	7
S. braenderup	1	3
S. brandenburg	14	9
S. breandercap		1
S. bredeney		1
S. cannstatt		3
S. chester		1
S. derby		1
S. enteriditis	77	81
S. friedrichsfelde		2
S. group B	10	2
undifferentiated	7	
S. haardt	0	0
S. hadar	77	115
S. havana	5	2
S. heidelberg	40	86
S. indiana		1
S. infantis	20	4
S. istanbul	2	1
S. java	8	3
S. javiana	4	1

	NUMBER OF ISOLATES 1989/90	1990/91
S. kentucky		1
S. litchfield	0	0
S. livingstone		1
S. mbandaka	0	0
S. miami		0
S. minnesota		0
S. montevideo	7	9
S. muenchen	15	12
S. newport	16	6
S. ohio	1	3
S. oranienburg	0	1
S. panama	4	1
S. paratyphi A	0	2
S. paratyphi B	0	0
S. poona		1
S. potsdam		1
S. rubislaw		1
S. saint paul	32	36
S. san diego		2
S. schwarzengrund	6	2
S. senftenberg	1	1
S. species	33	78
S. stanley	5	7
S. tennessee	2	7
S. thompson	22	23
S. typhi	12	4
S. typhimurium	91	73
S. uganda		2
S. virchow	14	3
S. weltvreden	10	3
S. worthington		1
Salmonella non-typeable		3
Salmonella ssp.		1
Salmonella, non-motile		4

Table 6-6. Percentages of Organisms Resistant to Antibiotics (Selected)

	Gentamicin	Tobramycin	Amikacin	Cefazolin/ Cephalothin	Cefoxitin	Cefotaxime	Co-trimoxazole	Nitrofurantoin	Tetracycline	Chloramphenicol	Clindamycin	Erythrocine	Vanomycin	Norfloxacin	Ceftazidime	Penicillin	Ampicillin	Ticarcillin/Pip	Cloxacillin	No. Tested
Acinetobacter anitratus	0	0		94	77		28	100	25								78			69
Acinetobacter lwoffi	1			79	66		10	79	4								23			106
Aeromonas hydrophila	0			43	2		11	0	0								94			143
Citrobacter diversus	0	0	0	0	0		0	0	6								100	0		18
Citrobacter freundii	0			46	55		33	8	51								56			68
Enterobacter aerogenes	0			85	100		13	19	40								100			9
Enterobacter agglomerans	0			92	58		0	0	0								90			31
Enterobacter cloacae	0	0	0	99	95		8	22	29								97	0		153
Escherichia coli		45	0	15	<1	0	18	<1	29					0			43	15		2,527
Klebsiella oxytoca	0			18	3		4	3	10								98			132
Klebsiella pneumoniae	2		0	7	3		12	27	22								96			346
Morganella morganii	0			100	0		5	14	35								100			41
Moraxella sp.	0			17	20	1	29		0								26			27
Plesiomonas shigelloides	25			0			0										86			7
Proteus mirabilis	1			9	1		8	60	98								26			322
Proteus vulgaris	0			100	11		18	82	31								100			40
Pseudomonas aeruginosa	11	<1	30				50							6	0			2		281
Pseudomonas cepacia	92	96	85				3							16	0			0		73
Salmonella hadar	0			0			0										0			12
Salmonella typhimurium	0			0			0										0			12
Serratia marcescens	5	NA		100	25		0	86	96								70			27
Shigella flexneri	0			15	0		30										78			35
Shigella sonnei	0			0			0										64			11
Yersinia enterocolitica	0			100			0										100			11
Staphylococcus aureus	2			1			<1			2	13	16				91				12,003
Coagulase neg. Staphylococci	69			14			30			21	38	43	0			69			20	72
Staphylococcus saprophyticus	0			22			16			16	59	54				92			18	91
Enterococcus species								1	66		77	82	0				3			632

ENVIRONMENTAL MICROBIOLOGY

TABLE 7-1, NUMBER OF SAMPLES TESTED/ENVIRONMENTAL MICROBIOLOGY

	1988 - 89	1989 - 90	1990 - 91
A. WATER - ROUTINE			
Membrane Filtration (MF)	39,189	39,912	39,079
Most Probable Number (MPN)	4,268	4,079	5,228
Standard Plate Counts (SPC)	21,664	21,774	21,828
B. FOOD			
Surveillance			
Food	246	194	161
Ice Cream	2,345	2,215	1,728
Outbreaks			
Food	200	269	274
Total	2,791	2,678	2,163

Positive = TC >2/100 mL for all drinking water.
Positive = TC and/or FC > 200/100 mL for all recreational water.

TABLE 7-2, ROUTINE WATER TESTING, MEMBRANE FILTRATION

	Total Coliform		Fecal Coliform	
Sample Source/Type	Total Number of Samples	Number Positive	Total Number of Samples	Number Positive
Raw	4,174	373	1,114	209
Municipal	18,856	365	754	9
Well	6,541	959	222	29
Distribution System	74	2	72	0
Ice Machine	56	2	0	0
Pool	3,004	66	68	2
Water Main	871	33	0	0
Miscellaneous (Pumphouse, standpipe, spring, cistern, dugouts, hydrants, reservoir, gravel pits)	820	282	789	150
TOTAL	34,396	2,082	3,019	399

Positive: TC > 2/100 mL for all drinking waters.
Positive: TC and/or FC >200/100 mL for all recreational waters

TABLE 7-3, PSEUDOMONAS AERUGINOSA DETECTION

	Number Positive / Number Tested		
Source/Sample	1988 - 1989	1989 - 1990	1990 - 1991
Swimming Pools Whirlpools Others	0/74 64/389 24/95	4/94 100/699 22/92	24/177 202/830 22/94
	88/558 15.7%	126/885 14.2%	247/1101 22.4%

Positive = Any number pseudomonas/per 100 mL

TABLE 7-4, ROUTINE WATER TESTING, MOST PROBABLE NUMBER

	Total Coliform		Fecal Coliform	
Sample Source/Type	Total Number of Samples	Number Positive	Total Number of Samples	Number Positive
DRINKING				
Raw	131	39	94	16
Municipal	1,329	236	1,146	94
Well	310	82	199	21
Distribution System	294	76	239	29
SUB-TOTAL	2,063	433	1,678	160
RECREATIONAL				
Lake or River	1,050	255	980	114
Miscellaneous (Dugouts, Ditch, Pond, Creek, Sewage	310	101	252	31
SUB-TOTAL	1,360	356	1,232	145
SEWAGE	1,805	858	1,803	903
GRAND TOTAL	5,228	1,647	4,713	1,208

Positive = TC >2/100 mL for all drinking water
Positive = TC and/or FC >200/100 mL for all recreational waters
Positive = >1500 and/or > 200 FC for sewage.

TABLE 7-5, FOOD TESTING RESULTS

	Number Positive / Number Tested		
Source/Sample	1988 - 1989	1989 - 1990	1990 - 1991
Surveillance			
Food	79/246 (32%)	68/194 (35%)	49/161 (30%)
Ice Cream	677/2345 (20%)	466/2215 (213+	353/1728 (20%)
Outbreaks			
Food	15/200 (8%)	91/296 (34%)	60/274 (22/%)
TOTAL	771/2791	625/2678	462/2163

TABLE 8-1 DIAGNOSTIC CHEMISTRY WORKLOADS - 1990/91

TEST	NO. OF PATIENTS	NO. OF CONTROLS	NO. OF STANDARDS	NO. OF REPEATS	TOTAL NO. OF TESTS	TOTAL UNITS
CHOLESTEROL/ TRIGLYCERICES	15,195 12,156	1,177	123	391	29,042	59,101
HDL-CHOLESTEROL	8,077	928	379	324	9,728	43,776
THYROXINE (T4)	5,905	496	768	103	7,272	50,904
T3 UPTAKE	1,567	482	170	35	2,254	22,540
TSH	5,126	541	1,076	48	6,791	47,537
VITAMIN B12 AND FOLATE	942	228	432	47	1,649	11,543
IRON AND TIBC	497	143	96	38	774	13,932
DIGOXIN	1,165	521	192	64	1,942	7,768
THEOPHYLLIN	391	431	180	76	1,078	3,234
GLYCATED HEMOGLOBIN	2,833	209	---	3	3,053	45,795
CHOLINESTERASE	226	33	9	--	268	804
TOTALS	41,924	5,189	3,445	1,129	63,851	306,934

TABLE 8-2, METABOLIC/ENDOCRINE SCREENING FINDINGS, 1990/91

	Identified in 1990-1991	Identified from 1965 to Mar. 31/91
PKU	1	25
Galactosemia	0	6
Galactosemia variants	4	17
Prolinemia	-	3
Histidinemia	-	20
Maple Syrup Urine Disease	-	2
Tyrosinemia	-	2
Hypothyroidism	5	46
TBG deficiency	-	2
Cystinuria	1	16
Glycinemia	-	1
Hartnup Disease	-	6
Congenital Adrenal Hyperplasia	0	1
Biotinidase Deficiency	2	2
TOTALS	13	150

TABLE 8-3, MATERNAL SERUM ALPHAFETOPROTEIN SCREENING

1990/91	First Screening	Follow up Specimens	Internal Repeats	Quality Control & Standards	Total Tests	Units
AFP TESTS	11,303	1,948	3,4358	4,754	21,440	64,320

Table 9-1 HIV Serology Summary

Manitoba Health Region	Number positive / Number tested		
	Serodiagnostic Program		Seroprevalence Study
	Dec. 1985-March 31/91	April 1/90-March 31/91	April 1/90-March 31/91
Winnipeg	277 / 10096	36 / 2964	66 / 19626
Central	4 / 423	0 / 135	1 / 1953
Eastman	0 / 251	0 / 97	4 / 2358
Interlake	5 / 383	1 / 120	0 / 1975
Norman	2 / 116	0 / 45	1 / 972
Parkland	2 / 154	1 / 47	2 / 1101
Thompson	1 / 188	0 / 64	2 / 2480
Westman	11 / 581	2 / 160	3 / 2678
Out-of-province	10 / 204	0 / 48	-----
Not MHSC confirmed	------	-------	------
Others	0 / 83	-------	0 / 311
TOTAL	312 / 12479 (2.5%)	40 / 3680 (1.08%)	79 / 33454 (0.23%)

Table 9-2, Serodiagnosis of HIV 1990-91 by Risk Group

	Number positive/Number tested		
Homosexuals	22 (5.21%)	422	(5.21%)
Bisexuals	5 (3.64%)	137	(3.64)
Haemophiliacs	1	4	
IVDU	2*	239	
Global	2	54	
Homosexual + IVDU	0	3	
Bisexuals + IVDU	0	10	
Global + IVDU	0	2	
Blood transfusions	2*	149	
Accidental exposure	0	412	
Heterosexual exposure	5*	386	
Offspring	0	21	
Other	1	1,841	
Total	40*(1.08%)	3,680	

*Of these 40, three were females, one in each of the 3 risk factors labelled.

Table 9-3, Serodiagnosis of HIV 1990-91 by Age Group

	Number positive/Number tested Males	Females	Total
0 - 11 months	0/23	0/13	0/36
1 - 9 years	0/31	0/13	0/44
10 - 19 years	1/92	1/146	2/238
20 - 29 years	9/790	0/651	9/1441
30 - 39 years	18/647	2/475	20/1122
40 - 49 years	7/295	0/186	7/481
50 - 59 years	2/87	0/51	2/138
60 - 69 years	0/60	0/31	0/91
70 - 79 years	0/30	0/27	0/57
≥ 80 years	0/11	0/21	0/32
TOTAL	37/2066 (1.8%)	3/1614 (0.18%)	40/3680 (1.08%)

Table 9-4, Serodiagnosis of HIV 1990-91 by Health Region

	Number positive	/	Number tested	
Winnipeg	36	/	2,964	(1.2%)
Central	0	/	135	
Eastman	0	/	97	
Interlake	1	/	120	
Norman	0	/	45	
Parkland	1	/	47	
Thompson	0	/	64	
Westman	2	/	160	
Out-of-Province	0	/	48	
	40		3,680	

Table 9-5, Serodiagnosis of HIV, Sex/Symptomatology Distribution 1985-12-01 to 1991-03-31

Number tested:	12,479	
Number (%) positive:	312	(2.5%)
Number of males tested:	7,154	
Number (%) males positive:	295	(4.1%)
Number of females tested:	5,324	
Number (%) females positive	17	(0.3%)
Number of symptomatic males tested:	1,236	
Number (%) positive symptomatic males	137	(11%)
Number of symptomatic females tested:	587	
Number (%) symptomatic females:	6	(1.02%)
Number of asymptomatic males tested:	5,917	
Number (%) positive asymptomatic males:	158	(2.67%)
Number of asymptomatic females tested:	4,738	
Number (%) positive asymptomatic females:	12	(0.25%)

Table 9-6, Serodiagnosis of HIV, Analysis of Risk Factors
1985-12-01 to 1991-03-31

Risk Factor	Number Positives/Number Tested	(% Positive)
Homosexuals	181 / 1668	(10.85%)
Bisexuals	46 / 522	(8.6%)
Haemophiliacs	19 / 77	(24.6%)
Intra Venous Drug User (IVDU)	8 / 957	(0.83%)
Global	10 / 220	(4.54%)
Homosexuals and IVDU	10 / 13	(76.9%)
Bisexuals and IVDU	4 / 14	(28.5%)
Global and IVDU	0 / 2	(--)
Blood Transfusions	5 / 816	(0.61%)
Accidental Parenteral Exposure	0 / 1107	(--)
Offspring of person at risk	2 / 59	(3.38%)
Heterosexual	21 / 2449	(0.85%)
Other risks	6 / 4475	(0.13%)
Total	312 / 12479	(2.5%)

Table 9-7, Serodiagnostic of HIV, Sex and Age Distribution
1985-12-01 to 1991-03-31

Age Group	Total No. Tested	MALES No. Positive/No. Tested (% Positive)	FEMALES No. Positive/No. Tested (% Positive)
0 - 11 mon	378	0 / 206	1 / 172
1 - 9 yrs	152	2 / 106	1 / 46
10 - 19 yrs	790	13 / 343	1 / 447
20 - 29 yrs	4953	116 / 2771 (4.1%)	7 / 2182 (0.36%)
30 - 39 yrs	3687	118 / 2176 (5.4%)	4 / 1511 (0.26%)
40 - 49 yrs	1450	31 / 876	1 / 574
50 - 59 yrs	520	12 / 347	0 / 173
60 - 69 yrs	303	2 / 201	1 / 101
70 - 79 yrs	163	0 / 94	1 / 70
80 or over	83	1 / 35	0 / 48
TOTAL	12479	295 / 7155	17 / 5324

Table 9-8, Serodiagnosis of HIV, Distribution by Health Region
1985-12-01 to 1991-03-31

Region		Number Positive/Number Tested			% Positive
Winnipeg	Undefined	237	/	8455	(2.80%)
	Central	31	/	931	(3.32%)
	North	5	/	354	(1.41%)
	South	4	/	356	(1.12%)
Winnipeg Total		277	/	10096	(2.74%)
Central		4	/	423	(0.94%)
Eastman		0	/	251	(---)
Interlake		5	/	383	(1.30%)
Norman		2	/	116	(1.72%)
Parkland		2	/	154	(1.29%)
Thompson		1	/	188	(0.53%)
Westman		11	/	581	(1.89%)
Out-of-Province		10	/	204	(4.90%)
Other		0	/	83	(---)
TOTAL		312	/	12479	(2.5%)

Table 9-9, Serodiagnosis of HIV by Health Region
1985-12 to 1991-3

Number Positive/Number Tested

	1985 Dec	1986	1987	1988	1989	1990	1991 Jan-Mar	TOTAL
Winnipeg Total	1/16	54/565	53/2297	50/2360	62/2362	49/2846	8/835	277/11281
Central	0/1	0/20	3/89	0/69	0/101	1/132	0/37	4/449
Eastman	--	0/14	0/41	0/35	0/54	0/90	0/24	0/258
Interlake	--	3/20	0/82	0/73	1/91	1/112	0/31	5/409
Norman	--	1/3	0/19	0/21	0/23	1/42	0/12	2/120
Parkland	--	1/4	0/27	0/39	0/46	1/43	0/13	2/172
Thompson	0/1	1/4	0/29	0/41	0/34	0/65	0/16	1/190
Westman	0/2	6/34	2/144	0/143	1/109	2/153	0/44	11/629
Out-of-Province	--	2/14	3/44	3/36	2/53	0/48	0/15	10/210
Other	0/2	0/18	0/54	0/5	0/4	0/0	0/0	0/83
TOTAL	1/22	68/696	61/2826	53/2822	66/2877	55/3531	8/1027	312/13801

Table 9-10, Serodiagnosis of HIV from 1985-12 to 1991-3

Number Positive/Number Tested

	1985 Dec	1986	1987	1988	1989	1990	1991 Jan-Mar	TOTAL
Homosexuals	1/9	41/386	34/526	33/353	36/319	30/392	6/127	181/2112
Bisexuals	0/2	15/21	11/137	5/141	9/140	6/135	0/34	46/610
Haemophiliacs	0/0	6/7	4/35	0/31	4/12	5/7	0/1	19/93
IDU	0/1	0/22	0/217	4/269	0/227	4/233	0/67	8/1036
Global	--	0/12	3/49	1/56	4/44	1/46	1/22	10/229
Homo + IDU	--	4/4	2/2	2/2	1/1	1/1	0/3	10/13
Bisex + IDU	--	--	2/2	1/1	1/1	0/5	0/5	4/14
Global + IDU	--	--	--	--	--	0/1	0/1	0/2
Blood transfusion	0/1	1/40	2/353	0/148	0/140	2/157	0/30	5/869
Accidental parenteral	0/1	0/42	0/180	0/241	0/272	0/413	0/100	0/1249
Heterosexual	0/1	1/53	1/387	6/806	8/842	4/585	1/1	21/2675
Offspring	0/1	--	0/8	0/8	1/13	1/21	0/8	2/59
Other/None	0/5	0/109	2/930	1/766	2/866	1/1535	0/628	6/4840*
Total	1/22	68/696	61/2826	53/2822	66/2877	55/3531	8/1027	312/13801*

* Only 12,479 persons were tested; a total of 1,322 persons negative for HIV antibodies but having several risk factors were counted more than one.

TABLE 9-11, SEROLOGY/PARASITOLOGY OVERALL STATISTICS - 1988-91

	1988 - 1989			1989 - 1990		
	NUMBER OF SPECIMENS	NUMBER OF TESTS	NUMBER OF UNITS	NUMBER OF SPECIMENS	NUMBER OF TESTS	NUMBER OF UNITS
SEROLOGY	84,978	213,869	3,051,124	86,376	230,336	3,309,719
R&D SEROLOGY	---	8,466	218,710	----	11,170*	360,971
PARASITOLOGY	9,819	9,882	443,655	9,659	9,759	437,655
TOTAL	94,797	232,216	3,713,489	96,035	251,265	4,108,345

TABLE 9-12, TOXOPLASMA DIAGNOSTIC

1988-89			1989 - 90			1990 - 91		
Number Tested	Number Positive	Number Prenatal Positive	Number Tested	Number Positive	Number Prenatal Positive	Number Tested	Number Positive	Number Prenatal Positive
888	6	0	1288*	2	0	1374	5	0

TABLE 9-13, BACTERIAL SEROLOGY

	Positive Level	1989-90 Number Tested	1989-90 Number Positive	1989-90 Positive Percent	1990-91 Number Tested	1990-91 Number Positive	1990-91 Positive Percent
Widal	>1:50	77	4	5.2	91	3	3.3
Brucella abortus	≥1:160	242	2	0.8	278	2	0.7
Pasteurella tularensis	≥1:180	59	3	5.1	63	3	4.8

TABLE 9-14, HEPATITIS SEROLOGY

	1989-1990			1990-1991		
	Number Tested	Number Positive	Percent Positive	Number Tested	Number Positive	Percent Positive
HbsAg*	8,230	504	6.1	8,003	489	6.1
Anti HBs	1,836	886	48.3	1,834	950	51.5
Anti HBc	1,116	185	16.6	1,114	154	13.8
HBeAg	429	221	51.5	415	188	45.3
Anti HBe	429	150	34.9	411	181	44.0
HAV IgG/IgM	113	64	56.6	116	50	43.1
HAV IgM	2,377	62	2.6	2,734	108	4.0
Anti HBcIgM	96	6	6.2	88	13	14.8
Anti Delta	8	0	0	21	2	9.5
Anti HCV	606	66	10.9	1,076	97	9.0

TABLE 9-15, RESPIRATORY SEROLOGY

A. Tests Done on Single Bloods

	1989-1990		1990-1991	
	Number Tested	Number Positive	Number Tested	Number Positive
ASOT	1,432	241	1,259	176
ADB	235	26	255	33

B. Tests Done on Paired Bloods

	1989-1990					1990-1991			
	Number Tested	Seroconversion	Significant Change in Ab	High Static	Presence IgM	Number Tested	Seroconversion	Significant Change in Ab	High Static
Mycoplasma pneumonia	3,737	7	-	46	34	4,215	25	16	84
Legionella spp.	1,128	2	1	-	3	1,306	2	-	2
Chlamydia spp.	419	4	-	6	12	314	-	-	1
Q Fever	112	-	-	-	-				
Adenovirus	1,481	13	1	17	N/A	2,086	6	1	4
RSV	1,399	22	-	9	N/A	1,849	-	-	4
Parainfluenza 1	1,391	4	1	4	N/A	1,837	5		
Parainfluenza 2	1,383	4	-	2	N/A	1,846	-	-	2
Parainfluenza 3	1,386	9	1	46	N/A	1,861	13	4	5
Influenza A	1,601	95**	1	58	N/A	2,014	1	1	3
Influenza B	1,472	1	1	5	N/A	1,900	34	-	10

TABLE 9-16, SYPHILIS SEROLOGY

	1989-90		1990-91	
	Number of Specimens	Number Reactive	Number of Specimens	Number Reactive
Blood	44,937	341	41,293	311
CSF	157	1	158	-
IFA	26	-	19	1

	1988-1989	1989-1990	1990-1991
No. Persons Reactive with Previous History	335	277	267
New Cases	5	5	1
New Cases in Registry	39	59	43

TABLE 9-17, HERPES SEROLOGY

	1989-90				1990-91			
	Number Tested	Sero conversions	Signi-ficant Change in Ab	Number IgM Positive	Number Tested	Sero conversions	Signi-ficant Change in Ab	Number IgM Positive
Herpes simplex	2,185	-	-	160	2,247	-	-	140
Herpes zoster	899	2	-	57	873	5	-	58
Cytomegalovirus	2,430	1	-	115	2,680	-	-	52
Epstein-Barr IgM	3,639	-	-	152	3,522	-	-	174

TABLE 9-18, MISCELLANEOUS VIRUS SEROLOGY

	1989-90				1990-91			
	Number Tested	Sero conversions	Signi-ficant Change in Ab	Number IgM Positive	Number Tested	Sero conversions	Signi-ficant Change in Ab	Number IgM Positive
Measles	1,063	-	-	12	1,361	-	-	
Mumps	594	-2	-	29	811	-	-	58

	1989-90			1990-91		
	Number Tested	Sero conversions	High Static Titres	Number Tested	Sero conversions	High Static Titres
RMSF	4	-	-	28	-	-
Rotavirus	137	-	1	125		
Cox. B. (1-5)	584	8	4	1,121		
Cox. A.				24		
WEE	51	-	-	20		
Rickettsia				38		
Entero				131	-	-
REO				4	-	-

TABLE 9-19, IMMUNE STATUS SEROLOGY

	1989-1990		1990-1991	
	Number Tested	Percent Susceptible %	Number Tested	Percent Susceptible %
Measles	92	26.1	118	12.7
Mumps	45	22.2	60	13.0
Diphtheria	102	30.4	122	31.1
Tetanus	108	10.2	204	6.9
Pertussis	447*	8.5	564**	3.4
Varicella/Zoster	2,104	5.3	1,853	7.4

* Outbreak of Pertussis, this figure includes diagnostic specimen
** 5 Seroconversions

TABLE 9-20, RUBELLA SEROLOGY

A. Total Number of Rubella Tests

	1989-1990	1990-1991
PHA Screening	26,406	25,504
IgM	753	550

B. Details of Prenatal Surveillance

	1989-1990			1990-1991		
Test	Number Tested	Susceptible	Percent	Number Tested	Susceptible	Percent
PHA	15,231	418	2.7	21,305	528	2.5

C. Details of Rubella Diagnostic Testing

	1989-1990			1990-1991		
Test	Number Tested	Number with IgM Present	Percent	Number Tested	Number with IgM Present	Percent
IgM	753	21	2.8	550	4	0.7

D. Details of Prenatal Surveillance - Hepatitis

	1989-1990				1990 - 1991			
Test	Number Tested	Number Positive	New Positive	%	Number Tested	Number Positive	New Positive	%
HBsAg	15,369	69	41	.27	21,832	73	34	0.16

TABLE 9-21, IMMUNOLOGY-SEROLOGY

	Normal Values	1989-1990 Number Tested	1989-1990 Number with Significant Results		1990-1991 Number Tested	1990-1991 Number with Significant Results	
CRP	<5mg/L	247	36		299	28	
Rheumatoid factor**	<1:24	2,200	117		2,826	149	
Antinuclear factor**	<1:160	1,369	75		1,899	58	
Antimitochondrial	<1:40	118	6		61	7	
Anti Smooth Muscle	<1:40	42	2		57	7	
Anti-DNA	<1:20	227	8		218	6	
Anti-Parietal	<1:20	8	3		1	0	
Thyroglobulin antibody**	<1:160	142	4		137	5	
Microsomal antibody**	<1:160	142	9		137	13	
IgG	564-1765 mg/dl	157	8(L)*	2(H)*	83	5(L)*	1(H)
IgM	45-250 mg/dl	153	6(L)*	3(H)*	77	4(L)*	4(H)
IgA	85-385 mg/dl	154	14(L)*		77	7(L)	3(H)
C_3	70-180 mg/dl	199	6(L)*	6(H)*	141	9(L)*	3(H)
C_4	163-44.7 mg/dl	199	15(L)*	3(H)*	142	26(L)*	4(H)

**Both tests marked with ** must be elevated to be considered an autoimmune thyroid disease.
*H - Higher than normal values
*L - Lower than normal values
Increased tested for immunoglobulins is mainly for the Lab & X-ray Units
**Rheumatoid factor/ANA testing - increased due to cross efficiency panel for Lyme Serodiagno

TABLE 9-22, PARASITOLOGY YEAR END REPORT

			1989/1990	1990/1991
	Total specimens examined/spec. positive		9865/	9365/1265
A.	Protozoa: Pathogenic			
	Blastocystis hominis		434	429
	Cryptosporidum spp.		92	48
	Dientamoeba fragilis		63	88
	Entamoeba histolytica		107	75
	Giardia lamblia		350	230
	Plasmodium vivax		6	8
	Plasmodium falciparum		2	0
	Non-Pathogenic			
	Chilomastix mesnili		20	9
	Entamoeba coli		292	339
	Entamoeba hartmanni		49	27
	Endolimax nana		281	205
	Iodamoeba butschlii		36	18
	Trichomones hominis		5	0
B.	Trematodes			
	Clonorchis sinensis		9	14
	Fasciola spp		0	1
	Schistosoma mansoni		0	2
C.	Cestodes			
	Diphyllobothrium spp		10	4
	Hymenolepis nana		14	20
	Taenia spp		1	5
D.	Nematodes			
	Ascaris lumbricoides		26	20
	Enterobius vermicularis		41	23
	Strongyloides stercoralis		13	14
	Hookwork spp.		51	32
	Trichuris trichura		42	33
E.	Arthropods			
	Phthirus pubis		7	9
	Pediculus humonia		2	2
	Nits		2	1
	Cimex spp.		2	0
	Ticks		6	5
	Mites		1	3
F.	Serology			
	Amoeba	samples	69	68
		positive	1	1
	Hydatid	samples	31	44
		positive	7	2
G.	Permanent Smears			
	Kinyoun Acid Fast		2722	2564
	Iron Hemtoxylin/Trichrome		3396	2563
H.	Miscellaneous Samples		N/R	171

TABLE 10-1 VIRUS ISOLATIONS

VIRUS ISOLATIONS	1989-1990 NO. OF DETECTIONS	1990-1991 NO. OF DETECTIONS
ADENONVIRUS		
Untyped Adenovirus	237	231
Adenovirus 1	16	19
Adenovirus 2	23	56
Adenovirus 3	64	26
Adenovirus 4		15
Adenovirus 5	16	9
Adenovirus 6	5	2
Adenovirus 7	1	2
Adenovirus 8	1	
Adenovirus 11		1
Adenovirus 12	1	1
Adenovirus 19	1	1
Adenovirus 21		2
Adenovirus 31		2
Adenovirus 37		1
Adenovirus 40	2	4
Adenovirus 41	14	24
COXSACKIE		
Coxsackie A9	2	6
Coxsackie B2		3
Coxsackie B4	1	4
Coxsackie B5	4	4
Coxsackie B	1	1
HERPES		
Varicella Zoster	40	48
Cytomegalovirus	127	159
Herpes Simplex	1,415	1,741
Herpes Simplex 01	10	34
Herpes Simplex 02	10	5
Herpes virus (by E.M.)		39
ECHOVIRUS		
Echovirus 1	1	
Echovirus 6	5	2
Echovirus 9	2	10
Echovirus 11	2	8
Echovirus 16		2
Echovirus 22	3	
Echovirus 30		1
CORONAVIRUSES	3	3

TABLE 10-1, CONT.

VIRUS ISOLATIONS (Cont'd)	1989-1990 NO. OF DETECTIONS	1990-1991 NO. OF DETECTIONS
INFLUENZA		
Influenza A	118	7
Influenza B	2	75
PARAINFLUENZA		
Parainfluenza 01	1	1
Parainfluenza 02	3	1
Parainfluenza 03	21	51
POLIOVIRUS		
Poliovirus 01	3	2
Poliovirus 02	4	2
Poliovirus 03	4	2
ENTEROVIRUS (Not typed)	35	54
Enterovirus 6		
CALICIVIRUS	1	
MOLLUSCUM CONTAGIOSUM	5	7
NORWALK		1
ROTAVIRUS	167	55
RESPIRATORY SYNCYTIAL VIRUS	434	233
REOVIRUS		
Reovirus	3	2
Reovirus 02	1	1
PAPILLOMAVIRUS		
Papillomavirus 06	377	311
Papillomavirus 11	383	314
Papillomavirus 16	372	386
Papillomavirus 18	369	318
RHINOVIRUS	9	7
SMALL ROUND ENTERIC VIRUS		91
SMALL ROUND VIRUS		
UNIDENTIFIED VIRUS	9	10